Appendix A

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Table A1-1. Alternative B: Prescriptions, Units, and Existing and Predicted Residual Stand Conditions. Residual stand conditions in Group Selection units apply only to areas within groups, not the entire unit. Residual stand conditions in Underburn units uncertain, not shown.

Unit	No.	Group Ac	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft^2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
2	A	—	6	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
2	B	—	21	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
3	A	—	206	VDT/30 in. DL/40%CC	202	56.6	321.5	17.1	65%	14	79	40.7	237.1	23.5	43%
3	B	—	45	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
3	C	—	26	HCPB	202	56.6	321.5	17.1	65%	14	202	54.3	314.7	16.5	65%
14	A	—	40	VDT/30 in. DL/40%CC	217	61.4	360.0	17.4	70%	16	83	44.5	222.3	22.1	39%
14	B	—	54	UB	510	54.5	252.1	9.5	67%	6	—	—	—	—	—
14	C	—	10	TFB/30 in. DL/40%CC	288	67.5	345.0	14.8	73%	2	104	40.0	169.7	17.3	35%
14	D	—	62	NT	131	50.7	270.0	19.4	51%	10	—	—	—	—	—
14	E	—	11	VDT/30 in. DL/40%CC	217	61.4	360.0	17.4	70%	16	83	44.5	222.3	22.1	39%
14	F	—	16	MAST	250	36.2	89.6	8.1	35%	0	159	31.0	69.4	9.0	28%
15	A	—	83	VDT/30 in. DL/40%CC	258	59.6	321.1	15.1	68%	22	67	40.4	216.2	24.2	38%
15	B	—	29	UB	258	59.6	321.1	15.1	68%	22	—	—	—	—	—
19	—	3	48	GS	143	54.8	300.0	19.6	56%	4	6	9.8	45.0	38.2	7%
21	A	—	100	VDT/30 in. DL/40%CC	155	67.6	420.0	22.3	81%	6	54	41.4	188.6	25.3	36%
21	B	—	10	HCPB	155	67.6	420.0	22.3	81%	6	155	67.7	420.0	19.0	86%
21	C	—	9	MAST	155	67.6	420.0	22.3	81%	6	155	67.7	420.0	19.0	86%
26	—	—	23	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
27	A	4	30	GS	123	63.5	330.0	22.2	70%	12	17	25.6	120.0	35.6	21%
27	B	—	13	HCPB	123	63.5	330.0	22.2	70%	12	123	63.5	330.0	22.2	69%
27	C	—	19	UB	123	63.5	330.0	22.2	70%	12	—	—	—	—	—
27	D	—	27	TFB/30 in. DL/40%CC	228	62.8	330.0	16.3	76%	8	66	40.0	214.5	24.5	43%
27	E	12	94	GS	79	52.6	270.0	25.1	61%	4	7	27.3	150.0	61.0	25%
29	A	—	51	VDT/30 in. DL/40%CC	125	62.9	375.0	23.5	74%	6	33	40.7	205.9	33.8	35%
29	B	—	48	UB	125	62.9	375.0	23.5	74%	6	—	—	—	—	—
29	C	—	82	UB	125	62.9	375.0	23.5	74%	6	—	—	—	—	—

Table A1-1. (continued).

Unit	No.	Group Ac	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft^2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
30	A	—	45	VDT/30 in. DL/40%CC	481	71.2	354.0	11.6	95%	8	43	51.3	240.5	32.0	43%
30	B	—	26	TFB/30 in. DL/40%CC	370	69.5	334.7	12.9	87%	6	85	40.2	160.0	18.6	39%
30	C	—	98	UB	370	69.5	334.7	12.9	87%	6	—	—	—	—	—
32	—	—	12	TFB/30 in. DL/40%CC	192	61.3	330.0	17.8	71%	20	48	40.1	221.4	29.2	39%
35	—	6	79	GS	349	67.8	300.0	12.6	68%	0	11	21.6	90.0	39.1	14%
36	—	—	11	HCPB	250	43.7	96.0	8.4	42%	0	159	28.2	57.1	8.1	25%
37	A	5	28	GS	349	67.8	300.0	12.6	68%	0	11	21.6	90.0	39.1	14%
37	B	1	14	GS	349	67.8	300.0	12.6	68%	0	11	21.6	90.0	39.1	14%
37	C	—	5	HCPB	112	45.3	210.0	18.6	44%	12	112	45.3	210.0	18.6	44%
37	D	2	21	GS	112	45.3	210.0	18.6	44%	12	16	20.9	90.0	32.6	17%
44	—	—	32	VDT/30 in. DL/40%CC	192	61.3	330.0	17.8	71%	20	48	40.1	221.4	29.2	39%
45	A	—	38	UB	260	61.9	315.0	14.9	68%	4	—	—	—	—	—
45	B	—	24	UB	260	61.9	315.0	14.9	68%	4	—	—	—	—	—
45	C	—	273	NT	260	61.9	315.0	14.9	68%	4	—	—	—	—	—
46	A	4	58	GS	139	55.2	270.0	18.9	57%	3	16	23.2	114.0	36.3	19%
46	B	4	22	GS	182	61.3	316.7	17.9	65%	1	12	19.5	90.0	37.5	15%
46	C	—	8	HCPB	139	55.2	270.0	18.9	57%	3	139	53.2	264.7	17.0	58%
47	—	—	10	HCPB	100	3.2	0.9	1.3	1%	0	59	1.0	0.2	0.8	0%
51	—	—	5	NT	1101	70.9	244.9	6.4	77%	3	—	—	—	—	—
53	A	—	15	TFB/30 in. DL/40%CC	491	76.3	335.0	11.2	99%	3	74	42.8	167.4	20.4	39%
53	B	—	64	TFB/30 in. DL/40%CC	491	76.3	335.0	11.2	99%	3	74	42.8	167.4	20.4	39%
53	C	—	129	UB	491	76.3	335.0	11.2	99%	3	—	—	—	—	—
54	—	—	7	UB	250	43.7	96.0	8.4	42%	0	—	—	—	—	—
74	—	—	32	MAST	60	10.4	44.2	11.6	10%	0	60	9.8	43.5	10.8	10%
209	B	—	4	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
213	A	—	51	VDT/30 in. DL/40%CC	139	55.2	270.0	18.9	57%	3	59	40.4	190.1	24.4	37%
213	B	—	19	TFB/30 in. DL/40%CC	418	62.7	258.3	10.7	62%	2	143	40.3	155.2	14.1	34%
221	A	—	30	MAST	305	71.8	410.6	15.7	93%	11	185	67.5	393.9	19.8	82%

Table A1-1. (continued).

Unit	No.	Group Ac	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft^2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
221	B	—	18	HCPB	250	32.5	32.6	4.9	14%	0	59	6.7	5.5	4.1	3%
221	C	—	4	HCPB	300	36.1	64.8	6.3	32%	0	59	4.8	7.0	4.7	4%
221	D	—	153	NT	327	68.3	422.2	15.4	87%	0	—	—	—	—	—
222	A	—	36	UB	305	71.8	410.6	15.7	93%	11	—	—	—	—	—
222	B	—	61	NT	123	63.5	330.0	22.2	70%	12	—	—	—	—	—
222	C	—	48	VDT/30 in. DL/40%CC	305	71.8	410.6	15.7	93%	11	34	41.2	210.0	33.9	35%
222	D	—	12	MAST	200	38.5	47.5	6.6	19%	0	59	13.4	14.0	6.6	6%
223	A	—	16	MAST	244	68.5	361.1	16.5	83%	6	201	63.7	343.2	17.7	—
223	B	—	98	UB	244	68.5	361.1	16.5	83%	6	—	—	—	—	—
227	A	—	18	MAST	250	21.7	11.9	3.0	6%	0	59	3.9	1.8	2.4	1%
227	B	—	3	UB	250	21.7	11.9	3.0	6%	0	—	—	—	—	—
228	A	—	15	TFB/30 in. DL/40%CC	288	67.5	345.0	14.8	73%	2	104	40.0	169.7	17.3	35%
228	B	—	15	MAST	92	59.2	360.0	26.8	62%	0	92	59.2	360.0	26.8	62%
231	—	—	43	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
235	A	—	34	NT	83	42.1	210.0	21.6	39%	1	—	—	—	—	—
235	B	—	6	MAST	250	36.2	89.6	8.1	35%	0	159	31.0	69.4	9.0	28%
235	C	—	32	NT	139	55.2	270.0	18.9	57%	3	—	—	—	—	—
235	D	—	50	VDT/30 in. DL/40%CC	260	61.9	315.0	14.9	68%	4	64	41.3	200.9	23.9	37%
235	E	—	17	TFB/30 in. DL/40%CC	260	61.9	315.0	14.9	68%	4	64	41.3	200.9	23.9	37%
542	A	7	49	GS	50	45.3	294.0	32.8	46%	14	30	36.0	222.0	37.1	33%
542	B	6	42	GS	50	45.3	294.0	32.8	46%	14	30	36.0	222.0	37.1	33%
542	C	19	126	GS	50	45.3	294.0	32.8	46%	14	30	36.0	222.0	37.1	33%
542	D	4	20	GS	50	45.3	294.0	32.8	46%	14	30	36.0	222.0	37.1	33%
542	E	—	16	HCPB	60	10.4	44.2	11.6	10%	0	60	9.8	43.5	10.8	10%
577	A	—	51	UB	217	62.4	320.5	16.4	76%	4	—	—	—	—	—
577	B	—	68	VDT/30 in. DL/40%CC	244	68.5	361.1	16.5	83%	6	62	40.6	183.3	23.2	39%
577	C	—	40	VDT/30 in. DL/40%CC	244	68.5	361.1	16.5	83%	4	62	40.6	183.3	23.2	39%
901	A	—	4	UB	96	41.8	220.0	20.5	40%	23	—	—	—	—	—
901	AH	—	127	UB	203	59.4	284.7	16.0	64%	10	—	—	—	—	—
901	AT	—	31	UB	96	41.8	220.0	20.5	40%	23	—	—	—	—	—

Table A1-1. (continued).

Unit	No.	Group Ac	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft^2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
901	B	—	104	UB	203	59.4	284.7	16.0	64%	10	—	—	—	—	—
901	G	—	24	UB	203	59.4	284.7	16.0	64%	10	—	—	—	—	—
904	A	—	88	UB	202	56.6	321.5	17.1	65%	5	—	—	—	—	—
904	B	—	46	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
904	C	—	30	UB	202	56.6	321.5	17.1	65%	5	—	—	—	—	—
206	—	—	29	HCGP	96	41.8	220.0	20.5	44%	23	96	41.9	220.0	16.1	44%
211	—	—	176	VDT/30 in. DL/40%CC	243	62.2	342.7	16.1	76%	4	64	40.2	200.4	23.9	40%
214	—	—	93	TFB/30 in. DL/40%CC	182	61.3	316.7	17.9	65%	1	65	41.1	170.8	21.9	34%
224	—	—	7	MAST	300	36.8	32.4	4.5	14%	0	59	5.8	3.8	3.5	2%
225	—	—	18	VDT/30 in. DL/40%CC	490	65.9	301.1	10.6	73%	4	118	40.7	180.2	16.7	37%
230	—	—	12	UB	288	67.5	345.0	14.8	73%	2	—	—	—	—	—
232	—	—	20	UB	288	67.5	345.0	14.8	73%	2	—	—	—	—	—
233	—	—	9	MAST	250	21.7	11.9	3.0	6%	0	59	3.9	1.8	2.4	1%
234	—	—	28	MAST	425	62.1	160.0	8.3	63%	0	259	55.0	143.9	10.1	53%
236	—	—	17	VDT/30 in. DL/40%CC	490	65.9	301.1	10.6	73%	4	118	40.7	180.2	16.7	37%
237	—	—	20	VDT/30 in. DL/40%CC	83	42.1	210.0	21.6	39%	1	67	41.2	203.1	23.6	36%
238	—	—	25	VDT/30 in. DL/40%CC	1101	70.9	244.9	6.4	77%	3	112	40.8	106.2	13.2	27%
240	—	—	10	MAST	83	42.1	210.0	21.6	39%	1	83	39.3	200.4	17.6	40%
241	—	—	10	HCPB	1101	70.9	244.9	6.4	77%	3	209	59.3	230.9	14.2	53%
541	—	—	7	NT	50	45.3	294.0	32.8	46%	14	—	—	—	—	—
543	—	—	31	UB	50	45.3	294.0	32.8	46%	14	—	—	—	—	—
547	—	1	12	GS	50	45.3	294.0	32.8	46%	14	30	36.0	222.0	37.1	33%
573	—	3	27	GS	50	45.3	294.0	32.8	46%	14	30	36.0	222.0	37.1	33%
575	—	—	69	UB	217	62.4	320.5	16.4	76%	4	—	—	—	—	—
576	—	—	9	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
900	—	—	40	UB	244	68.5	361.1	16.5	83%	6	—	—	—	—	—
902	—	—	72	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
906	—	2	17	GS	174	61.0	240.0	15.9	63%	2	4	8.2	30.0	36.8	7%
908	—	20	163	GS	701	74.4	275.0	8.5	78%	1	6	12.4	45.0	36.9	8%

Table A1-2. Alternative C: Prescriptions, Units, and Existing and Predicted Residual Stand Conditions. Residual stand conditions in Underburn units uncertain, not shown.

Unit	No.	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
2	A	6	NT	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
2	B	21	NT	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
3	A	206	TFB/30”DL/40 %CC	202	56.6	321.5	17.1	65%	14	79	40.7	237.1	23.5	43%
3	B	45	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
3	C	26	HCPB	202	56.6	321.5	17.1	65%	14	202	54.3	314.7	16.5	65%
14	A	40	TFB/30”DL/40 %CC	217	61.4	360.0	17.4	70%	16	83	44.5	222.3	22.1	39%
14	B	54	UB	510	54.5	252.1	9.5	67%	6	—	—	—	—	—
14	C	10	HCPB	288	67.5	345.0	14.8	73%	2	288	67.5	345.0	14.8	73%
14	D	62	NT	131	50.7	270.0	19.4	51%	10	—	—	—	—	—
14	E	11	TFB/30”DL/40 %CC	217	61.4	360.0	17.4	70%	16	83	44.5	222.3	22.1	39%
14	F	16	MAST	250	36.2	89.6	8.1	35%	0	159	31.0	69.4	9.0	28%
15	A	83	HCGP	258	59.6	321.1	15.1	68%	22	151	52.4	303.7	19.2	58%
15	B	29	UB	258	59.6	321.1	15.1	68%	22	—	—	—	—	—
19	—	48	TFB/30”DL/50 %CC	143	54.8	300.0	19.6	56%	4	114	50.0	270.6	20.9	50%
21	A	100	TFB/30”DL/50 %CC	155	67.6	420.0	22.3	81%	6	75	51.1	258.4	25.1	51%
21	B	10	HCPB	214	67.6	420.0	22.3	86%	6	214	67.7	420.0	19.0	86%
21	C	9	MAST	214	67.6	420.0	22.3	86%	6	214	67.7	420.0	19.0	86%
26	—	23	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
27	A	30	HCPB	123	63.5	330.0	22.2	70%	12	123	63.5	330.0	22.2	69%
27	B	13	HCPB	123	63.5	330.0	22.2	70%	12	123	63.5	330.0	22.2	69%
27	C	19	UB	123	63.5	330.0	22.2	70%	12	—	—	—	—	—
27	D	27	MAST	228	62.8	330.0	16.3	76%	8	174	59.0	315.8	18.2	70%
27	E	94	NT	79	52.6	270.0	25.1	61%	4	—	—	—	—	—
29	A	51	NT	125	62.9	375.0	23.5	74%	6	—	—	—	—	—
29	B	48	NT	125	62.9	375.0	23.5	74%	6	—	—	—	—	—
29	C	82	NT	125	62.9	375.0	23.5	74%	6	—	—	—	—	—
30	A	45	TFB/30”DL/50 %CC	481	71.2	354.0	11.6	95%	8	57	53.5	254.4	28.6	48%
30	B	26	NT	370	69.5	334.7	12.9	87%	6	—	—	—	—	—
30	C	98	NT	370	69.5	334.7	12.9	87%	6	—	—	—	—	—

Table A1-2. (continued).

Unit	No.	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
32	—	12	NT	192	61.3	330.0	17.8	71%	20	—	—	—	—	—
35	—	79	UB	349	67.8	300.0	12.6	68%	0	—	—	—	—	—
36	—	11	HCPB	250	43.7	96.0	8.4	42%	0	159	28.2	57.1	8.1	25%
37	A	28	HCPB	349	67.8	300.0	12.6	68%	0	349	67.9	300.0	11.6	68%
37	B	14	TFB/30”DL/50 %CC	349	67.8	300.0	12.6	68%	0	167	50.2	205.3	15.0	44%
37	C	5	HCPB	112	45.3	210.0	18.6	44%	12	112	45.3	210.0	18.6	44%
37	D	21	HCPB	112	45.3	210.0	18.6	44%	12	112	45.3	210.0	18.6	44%
44	—	32	TFB/30”DL/40 %CC	192	61.3	330.0	17.8	71%	20	48	40.1	221.4	29.2	39%
45	A	38	HCPB	260	61.9	315.0	14.9	68%	4	209	55.9	300.6	16.3	62%
45	B	24	HCPB	260	61.9	315.0	14.9	68%	4	209	55.9	300.6	16.3	62%
45	C	273	HCPB	260	61.9	315.0	14.9	68%	4	209	55.9	300.6	16.3	62%
46	A	58	TFB/30”DL/40 %CC	139	55.2	270.0	18.9	57%	3	59	40.4	190.1	24.4	37%
46	B	22	TFB/30”DL/40 %CC	182	61.3	316.7	17.9	65%	1	65	41.1	170.8	21.9	34%
46	C	8	HCPB	139	55.2	270.0	18.9	57%	3	139	53.2	264.7	17.0	57%
47	—	10	HCPB	100	3.2	0.9	1.3	1%	0	59	1.0	0.2	0.8	0%
51	—	5	NT	1101	70.9	244.9	6.4	77%	3	—	—	—	—	—
53	A	15	TFB/30”DL/50 %CC	491	76.3	335.0	11.2	99%	3	87	51.6	190.2	20.1	46%
53	B	64	HCPB	491	76.3	335.0	11.2	99%	3	205	68.4	314.5	16.8	80%
53	C	129	UB	491	76.3	335.0	11.2	99%	3	—	—	—	—	—
54	—	7	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
74	—	32	MAST	60	10.4	44.2	11.6	10%	0	60	9.8	43.5	10.8	10%
209	B	4	NT	250	43.7	96.0	8.4	42%	0	—	—	—	—	—
213	A	51	TFB/30”DL/40 %CC	139	55.2	270.0	18.9	57%	3	59	40.4	190.1	24.4	37%
213	B	19	TFB/30”DL/40 %CC	418	62.7	258.3	10.7	62%	2	143	40.3	155.2	14.1	34%
221	A	30	MAST	305	71.8	410.6	15.7	93%	11	185	67.5	393.9	19.8	82%
221	B	18	HCPB	250	32.5	32.6	4.9	14%	0	59	6.7	5.5	4.1	3%
221	C	4	HCPB	300	36.1	64.8	6.3	32%	0	59	4.8	7.0	4.7	4%
221	D	153	NT	327	68.3	422.2	15.4	87%	0	—	—	—	—	—
222	A	36	UB	305	71.8	410.6	15.7	93%	11	—	—	—	—	—
222	B	61	NT	123	63.5	330.0	22.2	70%	12	—	—	—	—	—

Table A1-2. (continued).

Unit	No.	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
222	C	48	TFB/30”DL/40 %CC	305	71.8	410.6	15.7	93%	11	34	41.2	210.0	33.9	35%
222	D	12	MAST	200	38.5	47.5	6.6	19%	0	59	13.4	14.0	6.6	6%
223	A	16	MAST	244	68.5	361.1	16.5	83%	6	201	63.7	343.2	17.7	77%
223	B	98	UB	244	68.5	361.1	16.5	83%	6	—	—	—	—	—
227	A	18	MAST	250	21.7	11.9	3.0	6%	0	59	3.9	1.8	2.4	1%
227	B	3	NT	250	21.7	11.9	3.0	6%	0	—	—	—	—	—
228	A	15	TFB/30”DL/40 %CC	288	67.5	345.0	14.8	73%	2	104	40.0	169.7	17.3	35%
228	B	15	MAST	92	59.2	360.0	26.8	62%	0	92	59.2	360.0	26.8	62%
231	—	43	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
235	A	34	HCPB	83	42.1	210.0	21.6	39%	1	83	42.1	210.0	16.5	39%
235	B	6	MAST	250	36.2	89.6	8.1	35%	0	159	31.0	69.4	9.0	28%
235	C	32	NT	139	55.2	270.0	18.9	57%	3	—	—	—	—	—
235	D	50	HCGP	260	61.9	315.0	14.9	68%	4	166	52.1	286.2	17.8	57%
235	E	17	HCGP	260	61.9	315.0	14.9	68%	4	166	52.1	286.2	17.8	57%
542	A	49	MAST	50	45.3	294.0	32.8	46%	14	50	45.3	294.0	22.2	46%
542	B	42	HCGP	50	45.3	294.0	32.8	46%	14	50	45.3	294.0	22.2	46%
542	C	126	TFB/30”DL/50 %CC	50	45.3	294.0	32.8	46%	14	50	45.4	294.0	14.1	46%
542	D	20	HCPB	50	45.3	294.0	32.8	46%	14	50	45.3	294.0	22.2	46%
542	E	16	HCPB	60	10.4	44.2	11.6	10%	0	60	9.8	43.5	10.8	10%
577	A	51	UB	217	62.4	320.5	16.4	76%	4	—	—	—	—	—
577	B	68	TFB/30”DL/50 %CC	244	68.5	361.1	16.5	83%	6	88	50.5	248.6	22.8	53%
577	C	40	TFB/30”DL/50 %CC	244	68.5	361.1	16.5	83%	4	88	50.5	248.6	22.8	53%
901	A	4	UB	96	41.8	220.0	20.5	40%	23	—	—	—	—	—
901	AH	127	UB	203	59.4	284.7	16.0	64%	10	—	—	—	—	—
901	AT	31	UB	96	41.8	220.0	20.5	40%	23	—	—	—	—	—
901	B	104	UB	203	59.4	284.7	16.0	64%	10	—	—	—	—	—
901	G	24	UB	203	59.4	284.7	16.0	64%	10	—	—	—	—	—
904	A	88	NT	202	56.6	321.5	17.1	65%	5	—	—	—	—	—
904	B	46	NT	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
904	C	30	NT	202	56.6	321.5	17.1	65%	5	—	—	—	—	—
206	—	29	HCGP	96	41.8	220.0	20.5	40%	23	96	41.9	220.0	16.1	40%
211	—	176	TFB/30”DL/40	243	62.2	342.7	16.1	76%	4	64	40.2	200.4	23.9	40%

Table A1-2. (continued).

Unit	No.	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
			%CC											
214	—	93	TFB/30”DL/40 %CC	182	61.3	316.7	17.9	65%	1	65	41.1	170.8	21.9	34%
224	—	7	MAST	300	36.8	32.4	4.5	14%	0	59	5.8	3.8	3.5	2%
225	—	18	TFB/30”DL/40 %CC	490	65.9	301.1	10.6	73%	4	118	40.7	180.2	16.7	37%
230	—	12	UB	288	67.5	345.0	14.8	73%	2	—	—	—	—	—
232	—	20	UB	288	67.5	345.0	14.8	73%	2	—	—	—	—	—
233	—	9	MAST	250	21.7	11.9	3.0	6%	0	59	3.9	1.8	2.4	1%
234	—	28	MAST	425	62.1	160.0	8.3	63%	0	259	55.0	143.9	10.1	53%
236	—	17	TFB/30”DL/50 %CC	490	65.9	301.1	10.6	73%	4	157	50.6	235.8	16.6	48%
237	—	20	MAST	83	42.1	210.0	21.6	39%	1	83	39.3	200.4	17.6	39%
238	—	25	HCGP	1101	70.9	244.9	6.4	77%	3	209	59.3	230.9	14.2	53%
240	—	10	HCPB	83	42.1	210.0	21.6	39%	1	83	42.1	210.0	16.5	39%
241	—	10	HCPB	1101	70.9	244.9	6.4	77%	3	209	59.3	230.9	14.2	53%
541	—	7	HCPB	50	45.3	294.0	32.8	46%	14	50	45.3	294.0	22.2	46%
543	—	31	UB	50	45.3	294.0	32.8	46%	14	—	—	—	—	—
547	—	12	NT	50	45.3	294.0	32.8	46%	14	—	—	—	—	—
573	—	27	HCPB	50	45.3	294.0	32.8	46%	14	50	45.3	294.0	22.2	46%
575	—	69	UB	217	62.4	320.5	16.4	76%	4	—	—	—	—	—
576	—	9	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
900	—	40	UB	244	68.5	361.1	16.5	83%	6	—	—	—	—	—
902	—	72	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
906	—	17	TFB/30”DL/40 %CC	174	61.0	240.0	15.9	63%	2	61	45.2	136.0	20.2	35%
908	—	163	TFB/30”DL/40 %CC	701	74.4	275.0	8.5	78%	1	100	41.4	111.1	14.3	29%

Table A1-3. Alternative D: Prescriptions, Units, and Existing and Predicted Residual Stand Conditions. Residual stand conditions in Underburn units uncertain, not shown. In stands with a range of canopy cover targets, data is shown for the average of these targets.

Unit	No.	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft^2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
2	A	6	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
2	B	21	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
3	A	206	VDT/30”DL/40 %CC	202	56.6	321.5	17.1	65%	14	79	40.7	237.1	23.5	43%
3	B	45	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
3	C	26	HCPB	202	56.6	321.5	17.1	65%	14	202	54.3	314.7	16.5	65%
14	A	40	TFB/30”DL/40-50%CC	217	61.4	360.0	17.4	70%	16	98	49.1	259.3	22.0	46%
14	B	54	UB	510	54.5	252.1	9.5	67%	6	—	—	—	—	—
14	C	10	VDT/30”DL/40 -50%CC	288	67.5	345.0	14.8	73%	2	124	45.0	201.0	17.2	41%
14	D	62	NT	131	50.7	270.0	19.4	51%	10	—	—	—	—	—
14	E	11	VDT/30”DL/40 -50%CC	217	61.4	360.0	17.4	70%	16	98	49.1	259.3	22.0	46%
14	F	16	MAST	250	36.2	89.6	8.1	35%	0	159	31.0	69.4	9.0	28%
15	A	83	HCGP	258	59.6	321.1	15.1	68%	22	151	52.4	303.7	19.2	58%
15	B	29	UB	258	59.6	321.1	15.1	68%	22	—	—	—	—	—
19	—	48	UB	143	54.8	300.0	19.6	56%	4	—	—	—	—	—
21	A	100	VDT/24”DL/50 -60%CC	155	67.6	420.0	22.3	81%	6	90	56.0	303.5	24.8	58%
21	B	10	HCPB	214	67.6	420.0	22.3	86%	6	214	67.7	420.0	19.0	86%
21	C	9	MAST	214	67.6	420.0	22.3	86%	6	214	67.7	420.0	19.0	86%
26	—	23	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
27	A	30	HCPB	123	63.5	330.0	22.2	70%	12	123	63.5	330.0	22.2	69%
27	B	13	UB	123	63.5	330.0	22.2	70%	12	—	—	—	—	—
27	C	19	UB	123	63.5	330.0	22.2	70%	12	—	—	—	—	—
27	D	27	HCPB	228	62.8	330.0	16.3	76%	8	174	59.0	315.8	18.2	70%
27	E	94	HCPB	79	52.6	270.0	25.1	61%	4	79	52.6	270.0	19.0	61%
29	A	51	VDT/24”DL/50 %CC	125	62.9	375.0	23.5	74%	6	57	50.5	274.8	29.6	51%
29	B	48	UB	125	62.9	375.0	23.5	74%	6	—	—	—	—	—
29	C	82	UB	125	62.9	375.0	23.5	74%	6	—	—	—	—	—
30	A	45	VDT/30”DL/50 %CC	481	71.2	354.0	11.6	95%	8	57	53.5	254.4	28.6	48%
30	B	26	UB	370	69.5	334.7	12.9	87%	6	—	—	—	—	—

Table A1-3. (continued).

Unit	No.	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft^2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
30	C	98	UB	370	69.5	334.7	12.9	87%	6	—	—	—	—	—
32	—	12	TFB/30”DL/40 %CC	192	61.3	330.0	17.8	71%	20	48	40.1	221.4	29.2	39%
35	—	79	UB	349	67.8	300.0	12.6	68%	0	—	—	—	—	—
36	—	11	HCPB	250	43.7	96.0	8.4	42%	0	159	28.2	57.1	8.1	25%
37	A	28	HCPB	349	67.8	300.0	12.6	68%	0	349	67.9	300.0	11.6	68%
37	B	14	VDT/30”DL/40 -50%CC	349	67.8	300.0	12.6	68%	0	137	45.2	181.4	15.8	39%
37	C	5	HCPB	112	45.3	210.0	18.6	44%	12	112	45.3	210.0	18.6	44%
37	D	21	NT	112	45.3	210.0	18.6	44%	12	—	—	—	—	—
44	—	32	VDT/30”DL/40 %CC	192	61.3	330.0	17.8	71%	20	48	40.1	221.4	29.2	39%
45	A	38	NT	260	61.9	315.0	14.9	68%	4	—	—	—	—	—
45	B	24	HCPB	260	61.9	315.0	14.9	68%	4	209	55.9	300.6	16.3	62%
45	C	273	HCPB	260	61.9	315.0	14.9	68%	4	209	55.9	300.6	16.3	62%
46	A	58	NT	139	55.2	270.0	18.9	57%	3	—	—	—	—	—
46	B	22	TFB/30”DL/40-50%CC	182	61.3	316.7	17.9	65%	1	79	46.0	209.0	22.0	40%
46	C	8	HCPB	139	55.2	270.0	18.9	57%	3	139	53.2	264.7	17.0	57%
47	—	10	HCPB	100	3.2	0.9	1.3	1%	0	59	1.0	0.2	0.8	0%
51	—	5	NT	1101	70.9	244.9	6.4	77%	3	—	—	—	—	—
53	A	15	VDT/20”DL/50 -60%CC	491	76.3	335.0	11.2	99%	3	101	56.5	226.5	20.2	54%
53	B	64	HCPB	491	76.3	335.0	11.2	99%	3	205	68.4	314.5	16.8	80%
53	C	129	UB	491	76.3	335.0	11.2	99%	3	—	—	—	—	—
54	—	7	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
74	—	32	MAST	60	10.4	44.2	11.6	10%	0	60	9.8	43.5	10.8	10%
209	B	4	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
213	A	51	VDT/30”DL/40 %CC	139	55.2	270.0	18.9	57%	3	59	40.4	190.1	24.4	37%
213	B	19	TFB/30”DL/40 %CC	418	62.7	258.3	10.7	62%	2	143	40.3	155.2	14.1	34%
221	A	30	MAST	305	71.8	410.6	15.7	93%	11	185	67.5	393.9	19.8	82%
221	B	18	HCPB	250	32.5	32.6	4.9	14%	0	59	6.7	5.5	4.1	3%
221	C	4	HCPB	300	36.1	64.8	6.3	32%	0	59	4.8	7.0	4.7	4%
221	D	153	NT	327	68.3	422.2	15.4	87%	0	—	—	—	—	—
222	A	36	HCPB	305	71.8	410.6	15.7	93%	11	185	67.5	393.9	19.8	82%

Table A1-3. (continued).

Unit	No.	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft^2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
222	B	61	NT	123	63.5	330.0	22.2	70%	12	—	—	—	—	—
222	C	48	VDT/30”DL/40-50%CC	305	71.8	410.6	15.7	93%	11	55	45.8	234.2	29.4	43%
222	D	12	MAST	200	38.5	47.5	6.6	19%	0	59	13.4	14.0	6.6	6%
223	A	16	MAST	244	68.5	361.1	16.5	83%	6	201	63.7	343.2	17.7	77%
223	B	98	UB	244	68.5	361.1	16.5	83%	6	—	—	—	—	—
227	A	18	MAST	250	21.7	11.9	3.0	6%	0	59	3.9	1.8	2.4	1%
227	B	3	UB	250	21.7	11.9	3.0	6%	0	—	—	—	—	—
228	A	15	TFB/30”DL/40%CC	288	67.5	345.0	14.8	73%	2	104	40.0	169.7	17.3	35%
228	B	15	MAST	92	59.2	360.0	26.8	62%	0	92	59.2	360.0	26.8	62%
231	—	43	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
235	A	34	NT	83	42.1	210.0	21.6	39%	1	—	—	—	—	—
235	B	6	MAST	250	36.2	89.6	8.1	35%	0	159	31.0	69.4	9.0	28%
235	C	32	NT	139	55.2	270.0	18.9	57%	3	—	—	—	—	—
235	D	50	NT	260	61.9	315.0	14.9	68%	4	—	—	—	—	—
235	E	17	NT	260	61.9	315.0	14.9	68%	4	—	—	—	—	—
542	A	49	MAST	50	45.3	294.0	32.8	46%	14	50	45.3	294.0	22.2	46%
542	B	42	HCGP	50	45.3	294.0	32.8	46%	14	50	45.3	294.0	22.2	46%
542	C	126	HCGP	50	45.3	294.0	32.8	46%	14	50	45.3	294.0	22.2	46%
542	D	20	NT	50	45.3	294.0	32.8	46%	14	—	—	—	—	—
542	E	16	HCPB	60	10.4	44.2	11.6	10%	0	60	9.8	43.5	10.8	10%
577	A	51	UB	217	62.4	320.5	16.4	76%	4	—	—	—	—	—
577	B	68	VDT/20”DL/50-60%CC	244	68.5	361.1	16.5	83%	6	107	55.4	279.5	22.0	59%
577	C	40	VDT/20”DL/50-60%CC	244	68.5	361.1	16.5	83%	4	107	55.4	279.5	22.0	59%
901	A	4	UB	96	41.8	220.0	20.5	40%	23	—	—	—	—	—
901	AH	127	UB	203	59.4	284.7	16.0	64%	10	—	—	—	—	—
901	AT	31	UB	96	41.8	220.0	20.5	40%	23	—	—	—	—	—
901	B	104	UB	203	59.4	284.7	16.0	64%	10	—	—	—	—	—
901	G	24	UB	203	59.4	284.7	16.0	64%	10	—	—	—	—	—
904	A	88	HCPB	202	56.6	321.5	17.1	65%	5	202	54.3	314.7	16.5	65%
904	B	46	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
904	C	30	HCPB	202	56.6	321.5	17.1	65%	5	202	54.3	314.7	16.5	65%
206	—	29	HCGP	96	41.8	220.0	20.5	40%	23	96	41.9	220.0	16.1	40%
211	—	176	VDT/30”DL/50	243	62.2	342.7	16.1	76%	4	93	50.1	274.4	23.3	54%

Table A1-3. (continued).

Unit	No.	Unit Ac	Prescription	Exist. Trees per Ac	Exist. Canopy Cover (%)	Exist. Basal Area (ft^2/ac)	Exist. Quadratic Mean Diam. (in.)	Exist. Relative Density	Exist. & Resid. Snags/ac >15 in. dbh	Resid. Trees per Ac	Resid. Canopy Cover (%)	Resid. Basal Area (ft^2/ac)	Resid. Quadratic Mean Diam. (in.)	Resid. Relative Density
			%CC											
214	—	93	VDT/30”DL/40-50%CC	182	61.3	316.7	17.9	65%	1	79	46.0	209.0	22.0	40%
224	—	7	MAST	300	36.8	32.4	4.5	14%	0	59	5.8	3.8	3.5	2%
225	—	18	VDT/30”DL/40%CC	490	65.9	301.1	10.6	73%	4	118	40.7	180.2	16.7	37%
230	—	12	UB	288	67.5	345.0	14.8	73%	2	—	—	—	—	—
232	—	20	UB	288	67.5	345.0	14.8	73%	2	—	—	—	—	—
233	—	9	MAST	250	21.7	11.9	3.0	6%	0	59	3.9	1.8	2.4	1%
234	—	28	MAST	425	62.1	160.0	8.3	63%	0	259	55.0	143.9	10.1	53%
236	—	17	VDT/24”DL/50%CC	490	65.9	301.1	10.6	73%	4	157	50.6	235.8	16.6	48%
237	—	20	VDT/24”DL/40%CC	83	42.1	210.0	21.6	39%	1	67	41.2	203.1	23.6	36%
238	—	25	UB	1101	70.9	244.9	6.4	77%	3	—	—	—	—	—
240	—	10	MAST	83	42.1	210.0	21.6	39%	1	83	39.3	200.4	17.6	39%
241	—	10	HCPB	1101	70.9	244.9	6.4	77%	3	209	59.3	230.9	14.2	53%
541	—	7	NT	50	45.3	294.0	32.8	46%	14	—	—	—	—	—
543	—	31	NT	50	45.3	294.0	32.8	46%	14	—	—	—	—	—
547	—	12	NT	50	45.3	294.0	32.8	46%	14	—	—	—	—	—
573	—	27	HCPB	50	45.3	294.0	32.8	46%	14	50	45.3	294.0	22.2	46%
575	—	69	UB	217	62.4	320.5	16.4	76%	4	—	—	—	—	—
576	—	9	MAST	250	43.7	96.0	8.4	42%	0	109	18.3	34.7	7.6	16%
900	—	40	UB	244	68.5	361.1	16.5	83%	6	—	—	—	—	—
902	—	72	UB	202	56.6	321.5	17.1	65%	14	—	—	—	—	—
906	—	17	VDT/30”DL/40%CC	174	61.0	240.0	15.9	63%	2	61	45.2	136.0	20.2	35%
908	—	163	VDT/30”DL/40-50%CC	701	74.4	275.0	8.5	78%	1	110	46.3	137.4	15.0	34%

Appendix A2: CWHR and Volume Analysis

Alt B	Unit Acres	Non-RHCA Acres	Group Ac
	Values		
Row Labels	Sum of Acres2	Sum of Acres3	
GS	848	593	102
HCGP	29	23	
HCPB	132	66	
MASTICATE	245	173	
MECHANICAL THIN	298	220	
NT	627	342	
RADIAL THIN	1079	745	
UB	1532	1023	
Grand Total	4790	3185	

Alt C	Unit Acres	Non-RHCA Acres
	Values	
Row Labels	Sum of Acres2	Sum of Acres3

Including RHCA

Rx	Alt B	Alt C	Alt D
Group Selection	848	0	0
Hand Cut Grapple Pile Burn	29	245	280
Hand Cut Pile Burn	132	717	665
Masticate	245	333	301
Thin from Below	298	1440	108
No Treatment	627	935	485
Radial Thin	1079	0	1193
Underburn	1532	1120	1758
Total	4790	4790	4790

Not Including RHCA

Rx	Alt B	Alt C	Alt D
Group Selection	593	0	0
Hand Cut Grapple Pile Burn	23	151	214

Alt B Thin Rx Summary

Rx	Diam Limit	Canopy Cover	Unit Ac	Non-RHCA Ac
Thin from Below	30	40	298	220
Radial Thin	30	40	1079	745
		Total	1377	965

Alt C Thin Rx Summary

Rx	Diam Limit	Canopy Cover	Unit Ac	Non-RHCA Ac
Thin from Below	30	40	968	658
Thin from Below	30	50	472	373
		Total	1440	1031

Alt D Thin Rx Summary

Rx	Diam Limit	Canopy Cover	Unit Ac	Non-RHCA Ac
Thin from Below	30	40	46	33
Thin from Below	30	40-50	62	45
Radial Thin	30	40	323	217

HCGP	246	151
HCPB	717	351
MASTICATE	333	252
Mechanical Thin	1440	1031
NT	935	622
UB	1120	777
Grand Total	4790	3185

Hand Cut Pile Burn	66	351	334
Masticate	173	252	229
Thin from Below	220	1031	78
No Treatment	342	622	323
Radial Thin	745	0	879
Underburn	1023	777	1128
Total	3185	3185	3185

Radial Thin	30	40-50	338	261
Radial Thin	30	50	221	138
Radial Thin	24	40	20	12
Radial Thin	24	50	68	68
Radial Thin	24	50-60	100	94
Radial Thin	20	50-60	123	89
		Total	1301	957

Secondary Treatments (incl RHCA)			
Rx	Alt B	Alt C	Alt D
HCPB	415	515	584
UB	2391	2523	1988
Totals	2806	3039	2572

Secondary Treatments (NOT incl RHCA)			
Rx	Alt B	Alt C	Alt D
HCPB	288	344	406
UB	1622	1641	1387
Totals	1910	1986	1793

Alt D	Unit Acres	Non-RHCA Acres
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
HCGP	280	214
HCPB	665	334
MASTICATE	301	229
MECHANICAL THIN	109	78
NT	485	323
RADIAL THIN	1193	879
UB	1758	1128
Grand Total	4790	3185

Alt B CC Rx	Unit Acres	Non-RHCA Acres
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
MECHANICAL THIN	298	220
0.4	298	220

RADIAL THIN	1079	745
0.4	1079	745
Grand Total	1378	965

Alt C CC Rx	Unit Acres	Non-RHCA Acres
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
40	968	658
50	472	373
Grand Total	1440	1031

Alt D CC Rx	Unit Acres	Non-RHCA Acres
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
30 <	991	694
0.4	370	250
MECHANICAL THIN	47	33
RADIAL THIN	323	217
0.5	221	138
RADIAL THIN	221	138
40-50%	400	306
MECHANICAL THIN	62	45
RADIAL THIN	338	261
20	123	89
50-60%	123	89
RADIAL THIN	123	89
24	188	175
0.4	20	12

RADIAL THIN	20	12
0.5	68	68
RADIAL THIN	68	68
50-60%	100	94
RADIAL THIN	100	94
Grand Total	1301	957

Alt B Rx2	Incl RHCA	Not incl RHCA
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
HCPB	379	259
UB	2185	1498
Grand Total	2564	1757

Alt B Rx3	Incl RHCA	Not incl RHCA
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
HCPB	36	29
UB	206	124
Grand Total	242	153

Alt C Rx2	Incl RHCA	Not incl RHCA
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
HCPB	303	208
UB	2269	1469
Grand Total	2572	1677

Alt C Rx3	Incl RHCA	Not incl RHCA
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
HCPB	212	136
UB	255	173
Grand Total	467	309

Alt D Rx2	Incl RHCA	Not incl RHCA
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
HCPB	315	223
UB	1988	1387
Grand Total	2303	1610

Alt D Rx3	Incl RHCA	Not incl RHCA
	Values	
Row Labels	Sum of Acres2	Sum of Acres3
HCPB	269	184
Grand Total	269	184

Appendix A3: Alternatives Summary

Sugarloaf	Alt B			Alt C			Alt D		
Acres and Volume by RX	Aces	Vol/Ac	Tot Vol	Aces	Vol/Ac	Tot Vol	Aces	Vol/Ac	Tot Vol
Group Selection (Grp)	71	15,500.0	1,100,500	0					
Thin from Below (TFB)	229	4,000.0	916,000	1315	4,000.0	5,260,000	76	4,000	304,000
Variable Density Thin (VDT)	763	5,000.0	3,815,000	0			859	5,000	4,295,000
TOTALS	1063		5,831,500	1315		5,260,000	935		4,599,000
			5.8 MMBF			5.3 MMBF			4.6 MMBF
Percent by Species and Size	Grp	TFB	Var	Grp	TFB	VDT	Grp	TFB	VDT
PP 23”-29.9” sawtimber *	1.5	0	0.7	1.5	0	0.7	1.5	0	0.7
SP 23”-29.9” sawtimber *	2.1	2.1	1.7	2.1	2.1	1.7	2.1	2.1	1.7
WF 23”-29.9” sawtimber *	35	15.2	26.2	35	15.2	26.2	35	15.2	26.2
DF 23”-29.9” sawtimber *	5.7	1.4	3.1	5.7	1.4	3.1	5.7	1.4	3.1
IC 23”-29.9” sawtimber *	1.9	0.6	2.5	1.9	0.6	2.5	1.9	0.6	2.5
ALL 10”-22.9” sawtimber **	52.6	79.4	65.1	52.6	79.4	65.1	52.6	79.4	65.1
Misc	1.2	1.3	0.7	1.2	1.3	0.7	1.2	1.3	0.7
TOTALS	100	100	100	100	100	100	100	100	100

LOGGING SYSTEMS	B	C	D
Tractor Acres	992	1295	935
Long Skid Acres (about 10%)	99	129	93
Skyline Acres	71	20	0
Helicopter Acres			
Totals	1162	1444	1028

ROAD MILES	B	C	D
Road - New Construction			
Road - Reconstruct	4.9	3.5	3.6
Temp Roads - New	4.3	2.8	2
Temp Roads - Reconstruct	4.9	3.2	2.8
Road Decommissioning	10.5		10.5

LANDING	B	C	D
New	31	21	24
Existing	49	39	41
Skyline	67	10	0
Totals	147	70	65

SPORAX ACRES	B	C	D
General Forest			
14” DBH and Greater	148	234	108
Recreation Areas			
3” DBH and Greater			
Totals	148	234	108

TREATMENTS	B	C	D
Group Selection (Grp)	71		
Thin from Below (TFB)	229	1315	76
Variable Density Thin (VDT)	763		859
TOTALS	1063	1315	935
Mastication Phase 1	223	334	278
Mastication Phase 2			
Mastication Phase 3			
Mastication Total	223	334	278
Handcut Pile Phase 1	375	1026	911
Handcut Pile Phase 2	308	340	490
Handcut Pile Phase 3		176	
Handcut Pile Total	683	1542	1401
Grapple Pile Phase 1		91	71
Grapple Pile Phase 2			
Grapple Pile Phase 3			
Grapple Pile Phase Total	0	91	71
Pile Burn Phase 1 (Hnd+Grp)	375	1117	982
Pile Burn Phase 2	308	340	490
Pile Burn Phase 3		176	
Hand + Grapple Pile Burn Total	683	1633	1472
Underburn Phase 1	1989	1083	1558
Underburn Phase 2	1771	2269	1772

Underburn Phase 3	159	291	268	
Valley Creek SIA		331	331	
Underburn Total	3919	3643	3598	

Appendix A4: Road Improvements

PC511A (21N15)	
Miles marker starts from southern junction with the La Porte-Quincy Road.	
Overall	Since this road is a utility corridor and due to the steepness and soils of the area, it is recommended that all chronic erosion (CE) gullies be addressed and the aggregate road surface throughout section of road re-established.
Mile Marker	1.33
Type	Forded Stream Crossing (FSC)
Description	There is about 575' of stream diversion due to the road here. Recommend putting in a culvert at the crossing and installing a critical dip downslope from the crossing to mitigate the diversion potential (DP).
Mile Marker	1.43
Type	FSC (two streams within 25ft of each other)
Description	Road is heavily eroded from 530' long Hydrologic-Connectivity (HC) leading into the ford. Recommend putting in two culverts at the dual crossing and installing a dip 250' feet before/upslope from the crossing. There is an old culvert 75' downstream that should be removed; this is a crossing for an old road that can possibly be obliterated? (Consult with Archeaology).
Mile Marker	1.71
Type	Stream Crossing (SC)
Description	There is a 1055' long HC leading down to the crossing here. Current culvert is undersized and overtopping. Recommend upgrading the culvert and installing 3 dips 100', 400' and 700' before/upslope from the crossing.
22N53	
Mile Marker	0.64
Type	SC
Description	Rilling caused by 675' HC leading into the crossing. Recommend installing a ditch-relieve culvert (DRC) 300' before/upslope from the crossing.
Mile Marker	1.39
Type	SC
Description	Culvert is 75% crushed/plugged and undersized. Recommend upgrading culvert.
Mile Marker	1.87 & 1.94
Type	SC
Description	Road not drivable beyond junction @ 1.66 with drivable unclassified (UC) road. The culvert at 1.87 is undersized and the fill blown out. The culvert at 1.94 is 80% plugged/crushed. Recommend pulling both culverts and decommissioning the road beyond the 1.66 mile marker, and possibly recommission the drivable UC road that continues from the junction to unit boundary. Consider keeping or closing the UC road post-project.
21N18A	
Overall	Due to the erosive nature of the soil type, and heavy traffic in the area, numerous mudholes exists on the road.
	Armoring the road with gravel at the various SC's indicated is highly recommended.
Mile Marker	0.23
Type	SC
Description	A 1220' long HC flows down to this crossing from near the start of the road, and continues flowing to the next crossing 110' down. There is extensive sedimentation from the road flowing into the stream parallel to the road. Recommend installing 3 DRC's at 300' intervals leading into the crossing, 1 DRC 50' after the crossing and ungrading the crossing itself. Armoring the approaches with gravel 300' on both sides and on top of the crossing is also recommended.
Mile Marker	0.25
Type	SC
Description	Culvert is almost completely plugged at outlet and about 30% plugged/crushed at inlet. Recommend upgrading the crossing and installing 1 DRC 200' after the crossing. Armoring the approaches with gravel 300' on both sides and on top of the crossing is also recommended
Mile Marker	0.64
Type	SC
Description	Culvert is completely submerged in silt. Recommend armoring the approach from the junction 200' before the crossing and upgrading the crossing.
21N42Y	
Mile Marker	0.36
Type	SC

Description	Road is gullying from HC. Recommend installing 1 dip 200' after the crossing.
Mile Marker	0.63
Type	SC
Description	Culvert at crossing is completely plugged/crushed at inlet. Recommend blading and armoring the gullying approach and doing some maintenance work on the crossing to return culvert to optimal capacity.

Appendix A5: Riparian Management Analysis

Riparian Management Objectives Analysis (Applies to alternative B)

RHCA and SMZ Buffers for Fuels and Timber Operations

Riparian Habitat Conservation Areas (RHCAs): Overall widths, per SAT guidelines, are 150' for non-fish bearing and 300' for fish bearing on each side of stream. The following buffers by treatments apply to RHCAs, unless otherwise specified below. All buffers are no-treatment buffers, unless specified otherwise. Buffers smaller than RHCAs are prescribed for treatments on slopes less than or equal to 35%. These buffers are doubled for slopes greater than 35% and where special aquatics concerns exist.
Groups Selection, Mechanical Thinning and Radial Thinning: Maintain standard RHCAs. These treatments by mechanical equipment would not occur within the full width of RHCAs.
Mastication: Apply a 25' buffer for SMZs, a 50' buffer for all non-fish bearing streams and a 75' buffer for fish bearing streams.
Handcut/Pile/Burn (HCPB): No buffer on all ephemeral streams, but retain at least 50% canopy cover and all riparian vegetation post treatment. Piles should be at least 25' from edge of stream. Apply a 25' buffer to all other non-fish bearing streams and a 50' buffer to fish bearing streams.
Handcut/Grapple Pile (HCGP): 50' buffer for ephemeral streams, 75' for all other non-fish bearing and 100' for fish bearing streams.
Underburns (UB): Use RHCA widths, but buffer is not a no-treatment buffer. Fire ignition would be prohibited within the buffer, but would be allowed to back into the buffer.

Riparian Management Objectives and Potential Effects

The Sugarloaf Hazardous Fuels Reduction Project is proposed with the main objective of fuels reduction. Surveys have shown that the fuel loading within the project area is contributing to a high risk of a large high-intensity wildfire. Certain legacy and recurring factors have also contributed to the reduced health and productivity of the riparian and aquatic ecosystems. In the interest of protecting and enhancing these sensitive riparian and aquatic resources, the Sugarloaf ID team decided to treat for fuels within the defined RHCAs and SMZs to reduce the risks posed by a high-intensity wildfire while facilitating the return of regular natural low-intensity fires that enhance riparian health and productivity. Historically, fire has been an integral disturbance agent in riparian systems (Dwire and Kauffman 2003). However, fire suppression has reduced the influence of fire, resulting in fuel accumulation and increased likelihood of large, severe wildfires (Taylor and Skinner 1998). RHCA treatments would provide a safer and more effective fire suppression environment, improve forest health, and provide for a more sustainable vegetation condition consistent with protecting and maintaining riparian habitat values.

Field surveys were conducted to verify the existence and condition of the streams and sensitive areas within units that would be mechanically treated. All RHCA treatments are designed to minimize erosion from soil disturbance and to protect and maintain the riparian vegetation that provides bank stabilization and habitat for wildlife, semi-aquatic and aquatic species. The ten RMO's for the Sugarloaf Hazardous Fuels Project are discussed below.

1. Maintain or restore water quality to a degree that provides for stable and productive riparian and aquatic ecosystems. Water quality parameters that apply to these ecosystems include timing, and character of temperature, sediment, and nutrients.

In addition to reducing the risk of high-intensity fires, thinning RHCAs will allow the ecosystem within the corridor to return to more productive historic conditions. Competition between co-dominant and dominate trees will decrease and growth rates will increase while mortality rates decline. Over time, the crowns of larger more fire resistant trees will fill in, increasing the necessary shade for temperature regulation. Where available, canopy cover will be maintained at 50 percent on average, however this may range between 60 percent along fish bearing streams and 40 percent for no-fish bearing streams. The treatments in the RCHA's would encourage forest growth and contribute to subsequent recruitment of large woody debris to stream channels. Large woody debris is generally scarce throughout the RHCA's due to a shortage of old growth vegetation.

Hand cutting and pile burning (HCPB) is a non-mechanical low impact and low disturbance treatment where only vegetation smaller than 9 inches in DBH are cut, piled and burned. The removal of small understory vegetation would have negligible impacts, as sufficient larger trees would be retained to provide the shading needed to regulate optimal stream temperatures and the root strength needed to maintain stable stream banks. Piles would be burned far enough away from stream edges to prevent sediment and excess nutrients from entering the stream.

Mastication, though a mechanical treatment, utilizes tracked machinery that exerts low ground pressure and causes less ground disturbance than tire-based equipment. During implementation, a masticator generally rides above the masticated material, spreading the equipment's weight over a larger area and further reducing ground pressure. This allowed for the smaller buffers (as compared to other mechanical treatments) associated with this treatment without compromising the parameters required to ensure proper hydrologic function. Mastication also only removes vegetation smaller than 9 inches in DBH, thus leaving enough larger trees and shrubs to provide the necessary shading to maintain optimal stream temperatures. Masticated materials are left in place as ground cover, which counteracts potential erosion and sedimentation.

Where under burns are proposed, fires would be ignited outside of the prescribed buffers and allowed to back in. Burn plans and prescriptions would be written to assure that burn intensities would remain low and Minimum Impact Suppression Techniques (MIST) would be implemented in order to retain riparian values. A study of prescribed burning in riparian areas in the Sierra Nevada suggests that effects of under burning in riparian conditions are limited in intensity and duration (Beche et al. 2005) due to higher moisture content of riparian vegetation. As such, prescribed fires within RHCAs typically burn non-uniformly and with low intensity, resulting in low tree mortality and negligible reductions to canopy cover. Shrub cover would be reduced, but this is relatively inconsequential as the majority of shading needed to maintain stream temperatures are provided by mature trees. Short-term and limited sediment and nutrient delivery to streams may occur after burning. However, Best Management Practice (BMP) evaluations from 2007 to 2009 for Plumas National Forest projects indicated sediment delivery on just one of the 28 units evaluated and the amount of sediment was judged to be minor and not significant to water quality. Additionally, scorched conifers often drop needles following low or moderate severity fires. This needle cast

provides ground cover that helps reduce rill and inter-rill erosion and sediment delivery to streams (Pannkuk and Robichaud 2003).

The machinery used for grapple piling generally employs tire-based equipment, which causes higher ground disturbances. The buffer widths associated with this treatment is prescribed to meet the optimal balance between protecting sensitive riparian ecosystems while reducing fuel loading and promoting forest health. Many of these forest stands are overstocked, resulting in smaller trees, higher mortality rates and thus higher fuel loading. Trees in overstocked stands are also more susceptible to disease and insects due to lowered vitality. Hand cut grapple piling within the RHCAs and SMZs would lower tree mortality rates and increase growth rates, promote healthier and larger trees and reduce fire risks. The buffers, together with the use of BMPs would be adequate in maintaining optimal stream temperatures and controlling erosion, along with filtering sediment from reaching the streams.

2. Maintain or restore the stream channel integrity, channel processes, and sediment regime under which the riparian and aquatic ecosystems developed. Elements of the sediment regime include the timing, volume, and character of sediment input and transport.

Direct impacts to stream channel integrity would be prevented by prohibiting mechanical thinning (i.e., groups selection, radial thinning) within RHCAs and SMZs. BMPs would result in only rare instances of project-generated erosion reaching adjacent stream channels so the sediment regime would not be affected by project activities. In addition to reducing the risk for high-intensity fires, thinning of the RHCA will allow the ecosystem within this corridor to return to a more stable historic condition. Historically, woody debris was a combination of large and intermediate logs.

Large woody debris (LWD) plays a central role in shaping stream channel integrity, channel processes and sediment regimes of these streams. Historically, the large and intermediate logs from fallen riparian trees regulate the timing, volume and character of sediment input and transport. An abundance of smaller woody material recruitment, however, can cause a buildup of debris jams. Such debris jams can alter the natural channel processes and sediment regimes while degrading channel integrity. Small woody materials decays faster, and are unable to withstand the force of the water during peak events. This affects the timing, volume and character of sediment input and transport, causing erosional processes such as scouring and undercutting within the channel and compromising channel integrity. The removal of smaller materials from future recruitment through HCPB, HCGP, and mastication and under burning would improve current stream channel integrity, channel processes and sediment regime. Mastication does treat within the RHCAs and SMZs but this action should not cause sedimentation into active streams due to the nature of the treatment which increases effective soil cover. The effective soil cover acts as a filter of sediment and minimizes surface erosion when surface runoff occurs.

Equipment induced ground disturbances would be limited because only slopes less than or equal to 35% would be entered with ground-based equipment adhering to the specific buffers as stated in table A1-1.

3. Maintain or restore in-stream flow to support desired riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges.

Interception and transpiration would be reduced and snowpack storage would be increased with the proposed treatments, possibly leading to higher runoff and infiltration rates. This would increase water availability to the streams and may increase in-stream flow and extend intermittent flow periods in the short term. However, the total area treated in any of the project analysis watersheds would be far less than the 20 percent reduction in basal area necessary to result in a measureable increase in stream flow (Troendle 2007). The increased growth rate of the remaining trees and the reduced fuel risks would contribute to the stability and effective function of the stream channels in the long term, as the canopies grow to provide more shade and the roots develop to stabilize stream banks. These factors, combined with the lowered fire risks, would regulate the in-stream flows to better support healthy riparian and aquatic habitats while maintaining the ability to route flood discharges.

4. Maintain or restore the natural timing and variability of the water table elevation in meadows and wetlands.

There are only a handful of existing meadows and wetlands within the Sugarloaf Hazardous Fuels Reduction Project area, and most are small in size and largely within the riparian zones of the streams that spread throughout the project area. All RHCA sensitive riparian areas (springs, seeps, meadows, and wetlands) would be adequately buffered to maintain current natural timing and variability of their respective water table elevations. A road currently bisecting a meadow is proposed for obliteration, and should contribute to the improvement of the natural timing and variability of the water table elevation locally near that meadow. All other meadows and wetlands would be adequately buffered to maintain current natural timing and variability of their respective water table elevations.

5. Maintain or restore the diversity and productive nature of native and desired non-native plant communities in the riparian zone.

All the different proposed treatments of this project are designed to reduce fuels and improve forest health. From HCPB to HCGP, these treatments remove competition from the remaining riparian vegetation, recycle nutrients through under burning and reduce fire risks. Vegetation grow faster and healthier with more space and less competition, nutrient recycling rejuvenates the system and promotes new and existing growth, and reduced fire risks offers survivability of the ecosystem in the event of a fire. All these factors contribute to improved diversity and productivity in the riparian zone.

6. Maintain or restore riparian vegetation to provide an amount and distribution of large woody debris (LWD) characteristics of natural aquatic riparian ecosystems.

Large woody debris (LWD) adds structure to stream channels and creates habitat for a variety of organisms, including fish and small burrowing mammals. It also acts as a reservoir, retaining moisture throughout the summer months. Many species of plants and animals depend on this moisture. Decomposing LWD slowly returns nutrients back into the system over the long term, and helps support a diverse population of riparian entities.

The various treatments proposed would remove many of the problematic smaller woody material and encourage the retained trees to grow at accelerated rates, improving LWD recruitment potential over time. LWD retention would be improved as logs would be larger and take longer to decompose; both natural and prescribed fires would burn with less intensity, reducing LWD consumption.

7. Maintain or restore habitat to support populations of well-distributed native and desired non-native plant, vertebrate, and invertebrate populations that contribute to the viability of riparian plant communities.

Living plants provide shade while their root systems enhance bank stability and create macro-pores that promote high infiltration rates. The decomposition of plant material contributes to soil matter and composition, provides nutrients and stores water. Care would be exercised during implementation, through use of BMPs and other measures, to ensure proper maintenance of ground cover and to retain vegetation that provide channel stability.

Vertebrates such as pocket gophers, moles, bats, and ground squirrels influence the viability of riparian plant communities. The proposed treatments are not expected to detrimentally affect vertebrate populations and function in the area.

Invertebrates contribute to the viability of riparian plant communities in many ways. They act as decomposers, shredding dead plant materials and burrowing into woody debris. Invertebrates recycle nutrients and influence soil structure. They improve soil porosity and enhance oxygen-penetrating capabilities. To maintain invertebrate populations, compaction and ground cover disturbances would be minimized through the use of low ground pressure equipment, sub-soiling of skid trails, and no-treatment zones and buffers.

8. Maintain or restore riparian vegetation to provide adequate summer and winter thermal regulation within the riparian and aquatic zones.

Where treatment would be conducted directly adjacent to stream channels, a minimum 50 percent canopy cover would be maintained. The buffers on the other more intensive treatment units (mastication and grapple piling), and the retention of at least 60% along fish bearing streams and 40 percent along non-fish bearing streams a canopy cover for all treatments within RHCAs and SMZs would be sufficient to ensure adequate summer and winter thermal regulation. Mechanical thinning, radial thinning and group selection harvests would not be conducted within RHCA and SMZ boundaries.

9. Maintain or restore vegetation to help achieve rates of surface erosion, bank erosion, and channel migration characteristics of those under which the desired communities developed.

Surface and bank erosion characteristics are not expected to change significantly with the proposed treatments. The prescriptions are designed to minimize impacts to the RHCAs and SMZs. Treatments within the RHCAs and SMZs would promote diversity and increase productivity of riparian communities and would positively affect surface and bank erosion characteristics in the long term. Burn piles would remove groundcover at point locations, but they would be located far enough from the channels where soil moving from these points would be trapped by ground cover

immediately adjacent to the piles. Under burning may slightly increase surface erosion in the short term, but would not be significant (refer to RMO #1). The buffers would also be adequate in maintaining desired surface and bank erosion characteristics.

Within the areas immediately adjacent to the stream channels, the physical effects derived from in-channel LWD would be improved, as no natural debris would be removed and future recruitment of LWD through the release of the remaining trees is secured. LWD is structurally important for channel morphology, channel function, and bank stability and improving LWD recruitment would restore the desired channel migration characteristics.

10. Maintain and restore riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific geo-climatic eco-region.

Maintenance of the riparian habitat necessary to foster unique genetic fish stocks would be accomplished by prescribing treatments that would maintain bank stability, ground cover, and sufficient shade.

It is expected that the prescribed treatments would not substantially impact fish populations within or downstream of the Sugarloaf Hazardous Fuels Reduction Project area. The best opportunity to improve channel conditions and fish habitat along these streams is through the proposed enhancement activities and the improvement of road drainage systems that are adjacent to stream channels.

Streamside Management Zone (SMZ) Plan and Resource Objectives

Plan Objectives

This plan describes goals, objectives and treatments for all streamside and riparian zones within the project area that would be impacted by management activities. As required by the Plumas Land and Resource Management Plan, this plan also identifies the vegetative treatments within riparian and streamside areas and the maximum amount of vegetation manipulation allowable to meet the stated objectives. In addition, the maximum area of soil exposure allowable is identified, as well as the necessary erosion control measures to meet the stated objectives. This plan also assesses those areas "... within the SMZ having oversteepened slopes (over 60 percent) with a very high erosion potential or high instability, and procedures to limit soil disturbance to no more than 5 percent of these areas per decade." Specific prescriptions for roads, skid trails, landings and other harvesting facilities are referenced and opportunities and procedures for restoration of deteriorated watershed conditions are presented.

Streamside Management Zones (Applies to all action alternatives)

Ephemeral streams with a defined channel but without evidence of annual scour and deposition occur on the Feather River Ranger District. These ephemeral streams may only scour during the two-, five- or ten-year storm event. This situation is frequent on the west side of the forest due to periodic high rainfall intensities or durations and to heavy organic litter accumulation (Taylor 2002). If these ephemeral channels were not protected from mechanized ground-base equipment, stream degradation could result. Neither the SAT guidelines nor the HFQLG FEIS specify interim guideline widths for channels without annual scour. Language in Component 2 of Appendix L 6-7 allows for field-refined

areas of RHCA protection. Guidelines were previously established in the Plumas National Forest Land and Resource Management Plan Appendix M - Guidelines for Widths of Streamside Management Zones (SMZs). These guidelines establish an SMZ width for streams based on active stream channel and sideslope stability. The width of SMZs varies from 0 to 50 feet of either side of the stream reach. For ephemeral streams, the range is 25 to 50 feet. These streams are also protected by application of BMPs from the Regional handbook (USDA Forest Service 2000). Appropriate SMZs will be identified prior to initiation of vegetation management activities.

For the Sugarloaf Hazardous Fuels Reduction Project, the standard SMZ width is 50 feet on each side of the ephemerals streams with no evidence of annual scour. However, due to high fuel loading within the project area, restoration work in the form of fuels reduction is proposed within the SMZs. Only low impact treatments such as HCPB, mastication and underburning would be implemented within SMZs and at least 75% effective organic ground cover would be easily retained, as mandated by the LRMP. Other BMPs and LRMP directives regarding SMZs would be adhered to ensure that these sensitive zones are not significantly impacted.

Definitions Used for Determining Riparian Conservation Areas (Applies to alternatives C and D)

The Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD)

The standard and guide for Riparian Conservation Area (RCA) widths are described below. RCA widths shown below may be adjusted at the project level if a landscape analysis has been completed and a site-specific Riparian Conservation Objectives (RCO) analysis demonstrates a need for different widths.

- *Perennial Streams*: 300 feet on each side of the stream, measured from the bank full edge of the stream
- *Seasonally Flowing Streams* (includes intermittent and ephemeral streams): 150 feet on each side of the stream, measured from the bank full edge of the stream
- *Streams in Inner Gorge1*: top of inner gorge
- *Special Aquatic Features or Perennial Streams with Riparian Conditions* extending more than 150 feet from edge of streambank or Seasonally Flowing streams with riparian conditions extending more than 50 feet from edge of streambank: 300 feet from edge of feature or riparian vegetation, whichever width is greater
  - Special Aquatic Features include: lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs
- *Other Hydrological or Topographic Depressions* without a defined channel: RCA width and protection measures determined through project level analysis.

Riparian Conservation Objective (RCO) Analysis (applies to alternatives C and D)

The following narrative documents the analytical basis for and evaluation of the Sugarloaf Hazardous Fuels Reduction Project conducted during the environmental analysis to determine:

- Consistency with the riparian conservation areas (RCAs) and riparian conservation objectives (RCOs) at the project level
- Implications to critical aquatic refuges (CARs) and the aquatic management strategy (AMS) goals at the landscape scale.

The first section identifies the aquatic management strategy (AMS) goals representing endpoints toward which management moves watershed processes and functions, habitats, attributes and populations. Moving ecological conditions toward these goals are aimed at restoring and maintaining the physical, chemical and biological integrity of the regions' waters as mandated by the *Clean Water Act* and will support the Forest Service's mission to provide habitat for riparian and aquatic-dependent species under the *National Forest Management Act*, *Organic Act*, and *Endangered Species Act*. Critical aquatic refuges (CARs) are subwatersheds (generally ranging from 10,000 to 40,000 acres) supporting known locations of threatened, endangered or sensitive species, highly vulnerable populations of native plant or animal species, or localized populations of rare native aquatic- or riparian-dependent plant or animal species.

The second section of this document describes RCAs and CARs are a set of land allocations that delineate aquatic, riparian, and meadow habitats, which are to be managed consistent with the following RCOs and associated standards and guidelines. The RCO analysis will address how the treatment within the land designation of RCAs and CARs will represent an incremental step to achieving AMS goals.

Aquatic Management Strategy (AMS) Goals

No. 1 Water Quality: Maintain and restore water quality to meet goals of the *Clean Water Act* and *Safe Drinking Water Act*, providing water that is fishable, swimmable and suitable for drinking after normal treatment.

No. 2 Species Viability: Maintain and restore habitat to support viable populations of native and desired non-native plant, invertebrate, and vertebrate riparian-dependent species. Prevent new introductions of invasive species. Where invasive species are adversely affecting the viability of native species, work cooperatively with appropriate State and Federal wildlife agencies to reduce impacts to native populations.

No. 3 Plant and Animal Community Diversity: Maintain and restore the species composition and structural diversity of plant and animal communities in riparian areas, wetlands and meadows to provide desired habitats and ecological functions.

No. 4 Special Habitats: Maintain and restore the distribution and health of biotic communities in special aquatic habitats (such as springs, seeps, vernal pools, fens, bogs, and marshes) to perpetuate their unique functions and biological diversity.

No. 5 Watershed Connectivity: Maintain and restore spatial and temporal connectivity for aquatic and riparian species within and between watersheds to provide physically, chemically and biologically unobstructed movement for their survival, migration and reproduction.

No. 6 Floodplains and Water Tables: Maintain and restore the connections of floodplains, channels, and water tables to distribute flood flows and sustain diverse habitats.

No. 7 Watershed Condition: Maintain and restore soils with favorable infiltration characteristics and diverse vegetative cover to absorb and filter precipitation and to sustain favorable conditions of stream flows.

No. 8 Streamflow Patterns and Sediment Regimes: Maintain and restore in-stream flows sufficient to sustain desire conditions of riparian, aquatic, wetland, and meadow habitats and keep sediment regimes as close as possible to those with which aquatic and riparian biota evolved.

No. 9 Stream Banks and Shorelines: Maintain and restore the physical structure and condition of stream banks and shorelines to minimize erosion and sustain desired habitat diversity.

Allowable Treatment within Riparian Conservation Areas (RCAs)

- Mechanical Thinning and Radial Thinning: 150’ for non-fish bearing and 300’ for fish bearing on each side of stream. Where available, canopy cover will be maintained at 50 percent on average; however this may range between 60 percent along fish bearing streams and 40 percent for no-fish bearing streams.

- Mastication: Apply a 25’ buffer for SMZs, a 50’ buffer for all non-fish bearing streams and a 75’ buffer for fish bearing streams.

- Hand cut/Pile/Burn (HCPB): No buffer on all ephemeral streams, but retain at least 50% canopy cover and all riparian vegetation post treatment. Piles should be at least 25’ from edge of stream. Apply a 25’ buffer to. Non-fish bearing Intermittent and Perennial streams and a 50’ buffer to all fish bearing streams.

- Hand cut/Grapple Pile (HCGP): 50’ buffer for ephemeral streams, 75’ for all other non-fish bearing and 100’ for fish bearing streams.

- Under burns (UB): Use RCA widths, but fire ignition would be prohibited within the buffer. However, fire would be allowed to back into buffer.

Riparian Conservation Objectives (RCOs)

The following Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges marked with an X were evaluated during the environmental analysis and considered prior to decision making. The Standard and Guidelines marked with an N/A were considered, but deemed not applicable to this project.

Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges		
X	91	Designate riparian conservation area (RCA) widths as described in Part B of this appendix. The RCA widths displayed in Part B may be adjusted at the project level if a landscape analysis has been completed and a site-specific RCO analysis demonstrates a need for different widths.
X	92	Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species.
X	93	Identify existing uses and activities in CARs and RCAs during landscape analysis. At the time of permit reissuance, evaluate and consider actions needed for consistency with RCOs.
X	94	As part of project-level analysis, conduct peer reviews for projects that propose ground-disturbing activities in more than 25 percent of the RCA or more than 15 percent of a CAR.
Standards and Guidelines Associated with Riparian Conservation Objective (RCO) No. 1: Ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses. (RCO No. 1 is linked to the following AMS goals: No. 1: Water Quality No. 2: Species Viability No. 7: Watershed Condition		
Identified beneficial uses — Beneficial uses are defined under California State law, in order protect against quality degradation of water resources and to meet state water quality objectives. The USDA Forest Service is required to protect and enhance existing and potential beneficial uses during water quality planning (California Regional Water Quality Control Board [CRWQCB], 1998, revised 2007). Beneficial uses of surface water bodies, including those that may be affected by activities on the PNF are listed in Chapter 2 of the Basin Plan (CRWQCB 1998, revised 2007). Existing and potential beneficial uses are defined for the tributaries that feed into Lake Oroville. All streams within the Sugarloaf Hazardous Fuels Reduction Project analysis eventually flow into the South Fork Feather River that feeds into Lake Oroville or to Slate Creek that flows into the North Yuba River then to New Bullards Bar Reservoir and eventually into Englebright Dam. The defined existing beneficial uses are identified below. The beneficial uses identified will be associated to Lake Oroville and/or sources to Englebright Reservoir.		

	1.	Municipal and domestic water supply include the uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply. (Englebright Reservoir and Lake Oroville)
	2.	Agricultural supply includes the uses of water for farming, horticulture, or ranching including, but not limited to, irrigation (including leaching of salts), stock watering, or support of vegetation for range grazing. (Irrigation: Englebright Reservoir and Lake Oroville; Stock Watering: Englebright Reservoir)
	3.	Hydropower generation includes the uses of water for hydropower generation. (Englebright Reservoir and Lake Oroville)
	4.	Water contact recreation includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skiing and scuba diving, surfing, white water activities, fishing, or use of natural hot springs. (Englebright Reservoir and Lake Oroville)
	5.	Non-contact water recreation includes uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities. (Englebright Reservoir and Lake Oroville)
	6.	Warm freshwater habitat includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. (Lake Oroville)
	7.	Cold freshwater habitat include uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. (Englebright Reservoir and Lake Oroville)
	8.	Wildlife habitat includes uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources. (Englebright Reservoir and Lake Oroville)
	9.	Spawning, reproduction, and/or early development include uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. (Lake Oroville)
X	95	For waters designated as “Water Quality Limited” (Clean Water Act Section 303(d)), participate in the development of Total Maximum Daily Loads (TMDLs) and TMDL Implementation Plans. Execute applicable elements of completed TMDL Implementation Plans.
		The analysis area for hydrology does not have any 303 (d) listed streams and even at a HUC 6 analysis area there are no fore mentioned streams.

X	96	Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages. – The proposed treatments within the RCAs will not affect water temperatures because the over story trees along the riparian corridor will not be affected. Mechanical thinning and radial thinning will be limited to 150' for non-fish bearing and 300' for fish bearing on each side of stream therefore not affecting the shading, microclimate, and water temperature. Hand thinning will not affect the over story trees along the riparian corridor because the treatment limits handing thinning to 9.9 inches dbh. Mastication will not affect the over story too along the riparian corridor because treatment limits mastication to 10 inches dbh. Although hand thinning and mastication are planned for more treatment within the RCAs their closer treatment to the riparian features (i.e., stream, spring, etc…) will not change the water temperatures because the overstory is still intact.
X	97	Limit pesticide applications to cases where project level analysis indicates that pesticide applications are consistent with riparian conservation objectives. – No pesticides are proposed to be used in this project.
X	98	Within 500 feet of known occupied sites for the California red-legged frog, Cascades frog, Yosemite toad, foothill yellow-legged frog, mountain yellow-legged frog, and northern leopard frog, design pesticide applications to avoid adverse effects to individuals and their habitats.
		No pesticides are proposed to be used in this project.
X	99	Prohibit storage of fuels and other toxic materials within RCAs and CARs except at designated administrative sites and sites covered by a Special Use Authorization. Prohibit refueling within RCAs and CARs unless there are no other alternatives. Ensure that spill plans are reviewed and up-to-date.
		BMP 2.11 (Equipment Refueling and Servicing) will prevent fuels, lubricants, cleaners, and other harmful materials from discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources.

Standards and Guidelines Associated with RCO No. 2: Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lake, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species. RCO No. 3 is linked to the following AMS goals:

No. 2: Species Viability

No. 3: Plant and Animal Community Diversity

No. 4: Special Habitats

No. 5: Watershed Connectivity

No. 6: Floodplains and Water Tables

No. 8: Streamflow Patterns and Sediment Regimes

No. 9: Streambanks and Shorelines).

X	100	Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity.
		Four priority roads within the project area (PC511A, 22N53, 21N18A, and 21N42Y), with a combined length of about 5 miles, are proposed to be reconstructed and improved with additional cross-drains to address current water quality concerns. Adding road drainage features would reduce the lengths of road connected to stream channels, eliminating or substantially reducing fine sediment impacts at a localized scale. These roads have culverts that have overtopped in the past and that have had its stream flow diverted away from its original stream course by fixing these issues hydrologic connectivity would be restored. All stream crossings and diversion potentials found on roads being proposed for decommissioning and obliteration will be addressed and fix any hydrologic connectivity issues along streams. The proposed activities do not include any restoration to meadows, wetlands, and other special aquatic features.
X	101	Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features.
		The replacement and/or installation of culverts on stream crossings will have the size and/or design approved by a fish biologist. Water drafting sites will be approved by a fish biologist or hydrologist. The approval of these fore mentioned sites by a hydrologist and/or fish biologist will ensure that no significant negative effects will occur.
		The proposed activities does not include any treatments within or along meadows, wetlands, and other special aquatic features therefore the existing condition will remain the same in regards to the timing, variability, and duration of floodplain inundation and water table elevation.
X	102	Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs.
		Some of the streams are not within the range of natural variability due to legacy hydraulic mining and high road density. The proposed activities does not specifically address legacy hydraulic mining but it does address the high road density issue. The proposed activities do fix areas that supply sediment to streams, and areas where the streams are overtopped and diverted outside their stream channel. These fixes will not resolve all the issues but is an incremental step towards natural variability.

X	103	Prevent disturbance to stream banks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites, sites authorized under Special Use Permits and designated off-highway vehicle routes.
		The proposed activities in this project do not expose bare soil or cut plant roots within or along its stream banks. See the matrix table above of the allowable treatment within RCAs.
X	104	In stream reaches occupied by, or identified as "essential habitat" in the conservation assessment for, the Lahonton and Paiute cutthroat trout and the Little Kern golden trout, limit stream bank disturbance from livestock to 10 percent of the occupied or "essential habitat" stream reach. (Conservation assessments are described in the record of decision.) Cooperate with State and Federal agencies to develop stream bank disturbance standards for threatened, endangered, and sensitive species. Use the regional stream bank assessment protocol. Implement corrective action where disturbance limits have been exceeded.
		No essential habitat is identified in the Sugarloaf Hazardous Fuels Reduction Project.
X	105	At either the landscape or project-scale, determine if the age class, structural diversity, composition, and cover of riparian vegetation are within the range of natural variability for the vegetative community. If conditions are outside the range of natural variability, consider implementing mitigation and/or restoration actions that will result in an upward trend. Actions could include restoration of aspen or other riparian vegetation where conifer encroachment is identified as a problem.
		No aspen restoration opportunities exist this project due to the fact that aspen is absent within the project boundary. Conifer encroachment along or within riparian features such as meadows does not exist within the project boundary. An age class, structural diversity, composition, and cover of riparian vegetation was not completed.
X	106	Cooperate with Federal, Tribal, State and local governments to secure in stream flows needed to maintain, recover, and restore riparian resources, channel conditions, and aquatic habitat. Maintain in stream flows to protect aquatic systems to which species are uniquely adapted. Minimize the effects of stream diversions or other flow modifications from hydroelectric projects on threatened, endangered, and sensitive species.
		The proposed action could potentially alter surface runoff patterns and timing of stream flow but the treatments with the RCAs should not affect the over story and effective soil cover to the point that surface runoff would reach a stream and deliver sediment. The proposed activities do fix stream issues where stream crossings are being overtopped and diverted away from its natural channel. The proposed project does minimize the effects of stream diversions or other flow modifications by fallowing BMPs and not proposing those types of activities.
N/A	107	For exempt hydroelectric facilities on national forest lands, ensure that special use permit language provides adequate in stream flow requirements to maintain, restore, or recover favorable ecological conditions for local riparian- and aquatic-dependent species.

Standard and Guideline Associated with RCO No. 3: Ensure a renewable supply of large down logs that: (1) can reach the stream channel and (2) provide suitable habitat within and adjacent to the RCA. RCO No. 3 is linked to the following AMS Goals: No. 2: Species Viability No. 3: Plant and Animal Community Diversity		
X	108	Determine if the level of coarse large woody debris (CWD) is within the range of natural variability in terms of frequency and distribution and is sufficient to sustain stream channel physical complexity and stability. Ensure proposed management activities move conditions toward the range of natural variability.
		Large woody debris (LWD) adds structure to stream channels and creates habitat for a variety of organisms, including fish and small burrowing mammals. It also acts as a reservoir, retaining moisture throughout the summer months. Many species of plants and animals depend on this moisture. Decomposing LWD slowly returns nutrients back into the system over the long term, and helps support a diverse population of riparian entities.
		The various treatments proposed would remove many of the problematic smaller woody material and encourage the retained trees to grow at accelerated rates, improving LWD recruitment potential over time. LWD retention would be improved as logs would be larger and take longer to decompose; both natural and prescribed fires would burn with less intensity, reducing LWD consumption. The removal of smaller materials from future recruitment through HCPB, HCGP, mastication and under burning would improve current stream channel integrity, channel processes and sediment regime.
Standards and Guidelines Associated with RCO No. 4: Ensure that management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian- dependent species. RCO No. 4 is linked to the following AMS Goals: No. 2: Species Viability No. 7: Watershed Condition		
X	109	Within CARs, in occupied habitat or "essential habitat" as identified in conservation assessments for threatened, endangered, or sensitive species, evaluate the appropriate role, timing, and extent of prescribed fire. Avoid direct lighting within riparian vegetation; prescribed fires may back into riparian vegetation areas. Develop mitigation measures to avoid impacts to these species whenever ground-disturbing equipment is used.
		For the Sugarloaf Project we have put in place an Aquatic Preserve no treatments are allowed in the buffered areas.
X	110	Use screening devices for water drafting pumps. (Fire suppression activities are exempt during initial attack.) Use pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats.
		BMP 2.5 (Water Source Development and Utilization) address water drafting sites.

X	111	Design prescribed fire treatments to minimize disturbance of ground cover and riparian vegetation in RCAs. In burn plans for project areas that include, or are adjacent to RCAs, identify mitigation measures to minimize the spread of fire into riparian vegetation. In determining which mitigation measures to adopt, weigh the potential harm of mitigation measures, for example fire lines, against the risks and benefits of prescribed fire entering riparian vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could be damaging to habitat or long-term function of the riparian community.
		Where under burns are proposed, fires would be ignited outside of the prescribed buffers and allowed to back in. Burn plans and prescriptions would be written to assure that burn intensities would remain low and Minimum Impact Suppression Techniques (MIST) would be implemented in order to retain riparian values. A study of prescribed burning in riparian areas in the Sierra Nevada suggests that effects of under burning in riparian conditions are limited in intensity and duration (Beche et al. 2005) due to higher moisture content of riparian vegetation. As such, prescribed fires within RHCAs typically burn non-uniformly and with low intensity, resulting in low tree mortality and negligible reductions to canopy cover. Shrub cover would be reduced, but this is relatively inconsequential as the majority of shading needed to maintain stream temperatures are provided by mature trees. Short-term and limited sediment and nutrient delivery to streams may occur after burning. However, Best Management Practice (BMP) evaluations from 2007 to 2009 for Plumas National Forest projects indicated sediment delivery on just one of the 28 units evaluated and the amount of sediment was judged to be minor and not significant to water quality. Additionally, scorched conifers often drop needles following low or moderate severity fires. This needle cast provides ground cover that helps reduce rill and inter-rill erosion and sediment delivery to streams (Pannkuk and Robichaud 2003).
N/A	112	Post-wildfire management activities in RCAs and CARs should emphasize enhancing native vegetation cover, stabilizing channels by non-structural means, minimizing adverse effects from the existing road network, and carrying out activities identified in landscape analyses. Post-wildfire operations shall minimize the exposure of bare soil.
N/A	113	Allow hazard tree removal within RCAs or CARs. Allow mechanical ground disturbing fuels treatments; salvage harvest or commercial fuel wood cutting within RCAs or CARs when the activity is consistent with RCOs. Utilize low ground pressure equipment, helicopters, over the snow logging, or other non-ground disturbing actions to operate off of existing roads when needed to achieve RCOs. Ensure that existing roads, landings, and skid trails meet Best Management Practices. Minimize the construction of new skid trails or roads for access into RCAs for fuel treatments, salvage harvest, commercial fuel wood cutting, or hazard tree removal.
N/A	114	As appropriate, assess and document aquatic conditions following the Regional Stream Condition Inventory protocol prior to implementing ground disturbing activities within suitable habitat for California red-legged frog, Cascades frog, Yosemite toad, foothill and mountain yellow-legged frogs, and northern leopard frog.

N/A	115	During fire suppression activities, consider impacts to aquatic- and riparian-dependent resources. Where possible, locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of RCAs or CARs. During pre-suppression planning, determine guidelines for suppression activities, including avoidance of potential adverse effects to aquatic- and riparian-dependent species as a goal.
X	116	Identify roads, trails, OHV trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions.
		The proposed activities in action alternatives address roads that degrade water quality or habitat for aquatic and riparian-dependent species. Some of the road issues may have been identified in the landscape analysis but the project level analysis specifically identifies and addresses them.
Standards and Guidelines Associated with RCO No. 5: Preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas. RCO No. 5 is linked to the following AMS goals: #1: Water Quality #2: Species Viability #3: Plant and Animal Community Diversity #4: Special Habitats #7: Watershed condition #9: Stream Banks and Shorelines		
X	117	Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports (or their successor publications): (1) "Process for Assessing PFC" TR 1737-9 (1993), "PFC for Lotic Areas" USDI TR 1737-15 (1998) or (2) "PFC for Lentic Riparian-Wetland Areas" USDI TR 1737-11 (1994).
		There is no range allotments within the project boundary and no hydrologic function of the meadows were done in a range management analysis.
X	118	Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (*Spagnum* spp.), (2) mosses belonging to the genus Meessia, and (3) sundew (*Drosera* spp.) Complete initial plant inventories of bogs and fens within active grazing allotments prior to re-issuing permits.
		There are no bogs or fens identified in the project boundary.

N/A	119	Locate new facilities for gathering livestock and pack stock outside of meadows and riparian conservation areas. During project-level planning, evaluate and consider relocating existing livestock facilities outside of meadows and riparian areas. Prior to re-issuing grazing permits, assess the compatibility of livestock management facilities located in riparian conservation areas with riparian conservation objectives.
N/A	120	Under season-long grazing:
		• For meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height).
		• For meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height).
		Determine ecological status on all key areas monitored for grazing utilization prior to establishing utilization levels. Use Regional ecological scorecards and range plant list in range handbooks to determine ecological status. Analyze meadow ecological status every 3 to 5 years. If meadow ecological status is determined to be moving in a downward trend, modify or suspend grazing. Include ecological status data in a spatially explicit Geographical Information System database.
		Under intensive grazing systems (such as rest-rotation and deferred rotation) where meadows are receiving a period of rest, utilization levels can be higher than the levels described above if the meadow is maintained in late seral status and meadow-associated species are not being impacted. Degraded meadows (such as that in early seral status requires total rest from grazing until they have recovered and have moved to mid- or late seral status.
N/A	121	Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings. Remove livestock from any area of an allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation.
Standard and Guideline Associated with RCO No. 6: Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species. RCO No. 6 is linked to all AMS goals.		
X	122	Recommend restoration practices in: (1) areas with compaction in excess of soil quality standards, (2) areas with lowered water tables, or (3) areas that are either actively down cutting or that have historic gullies. Identify other management practices, for example, road building, recreational use, grazing, and timber harvests, that may be contributing to the observed degradation.
		The obliteration of approximately 9.8 miles of non-system roads will uncompact an uncertain number of acres and put back to bio-productivity.
		There are no areas with identified water tables nor is their areas proposed for restoration on actively down cutting or that have historic gullies.

Standards and Guidelines for Critical Aquatic Refuges		
X	123	Determine which critical aquatic refuges or areas within critical aquatic refuges are suitable for mineral withdrawal. Propose these areas for withdrawal from location and entry under U.S. mining laws, subject to valid existing rights, for a term of 20 years.
		Not within the scope of this proposed action.
N/A	124	Approve mining-related plans of operation if measures are implemented that contribute toward the attainment or maintenance of aquatic management strategy goals.

Appendix A6: Standard Management Requirements and Monitoring

Design Features and Mitigation Measures

A6.1 Air Quality

The following operating procedures would be applied:

1. Mitigate dust from project activities by including standard dust abatement requirements in sale and project contracts (B6.33 and C5.31).

2. Conduct prescribed burns when favorable smoke dispersal is forecasted, especially near sensitive Class I areas.

3. Use appropriate smoke modeling software to predict smoke dispersion.

4. Minimize smoke emissions by following Best Available Control Methods.

5. Avoid burning on high visitor days and notify the public before burning.

6. Consider alternatives to burning.

7. Incorporate burn plan data into appropriate modeling software.

8. Comply with Title 17 of the 2004 California air pollution control laws and interim air quality policy and local smoke management programs.

    - Follow the Memorandum of Understanding on Prescribed Burning with the California Air Resources Board.

    - Burning permits would be acquired from the Butte County and Feather River Air Quality Management Districts. The Air Quality District would determine days burning is allowed. The California Air Resources Board (CARB) provides daily information on "burn" or "no burn" conditions. Burn plans will be designed and all fuel reduction burning will be implemented in a way to minimize emissions. Prescribed fire implementation will coordinate daily and seasonally with other burning permittees both inside and outside the forest boundary to help meet air quality standards.

    - All prescribed burning will be implemented in accordance with an agency approved Burn Plan that follows the Interagency Prescribed Fire Planning and Implementation Guide. Mitigations to lessen smoke impacts identified in the Smoke Management Plan (SMP) will be incorporated into Burn plans. SMPs will be approved by the local AQMDs.

Botany

Revegetation of disturbed areas with native species:

- All activities that require seeding or planting will need to use only locally collected native seed sources. Examples of proposed activities that may need to be seeded are road closures, landings, or skid trails. This will implement the USFS Region 5 policy (Stewart, 1994) that directs the use of native plant material for revegetation and restoration for maintaining "the overall national goal of conserving the biodiversity, health, productivity, and sustainable use of forest, rangeland, and aquatic ecosystems."

- An alternative method of erosion control where erosion is a particular concern and where adequate sources of local native seed are not available is to use weed-free seed or weed-free straw with seed-heads of non-persistent cereal grains such as white oats. This will provide erosion control until native species can naturally seed in. Use K-V or other funds as available for collecting and planting native grasses for revegetation of disturbed areas.

Mitigation measures for protection of sensitive and special interest plant species, and to prevent the spread of noxious weeds:

Various mitigation measures for the protection of Sensitive and Special Interest plant species, and to prevent the spread of noxious weeds, have been incorporated into the design of the Sugarloaf project. These mitigation measures would be applied on the ground during project implementation. Specific management prescriptions and acreages are given in the discussion of the effects of the proposed project on each rare plant species in the Biological Evaluation/Assessment (BA/E) and the Botany Report sections of the botany input, and for invasive species and noxious weeds in the Noxious Weed Risk Assessment and Management Strategy section.

- **Botany Controlled Areas (CAs) for Sensitive and Special Interest plant species.**

  Botany Controlled Areas (CAs) for Sensitive and Special Interest plant species would be avoided by ground-disturbing project activities. In general, activities within these CAs would be restricted to hand thinning and underburning. No burn piles would be placed within these CAs. The intent of these CAs is to avoid direct damage to plants and the soil structure (habitat) where they grow from the large machinery that would be used to implement most of the project treatments and to avoid the damage to plants that can occur from the intense heat produced by the burning of burn piles. Controlled Areas would be marked with suitable flagging and red Controlled Area tags ("flagged and tagged") prior to project layout and project implementation, and would be included on project layout and sale maps. In most cases, project activities that include fuels treatments to thin the forest would improve habitat conditions for these rare plant species. These botany CAs comprise only minor portions of project planning units.

- **Botany Controlled Areas (CAs) for Noxious Weeds.**

  Botany Controlled Areas (CAs) for noxious weed sites would be AVOIDED BY ALL PROJECT ACTIVITIES. No hand thinning or underburning would occur and no burn piles would be placed within these noxious weed CAs. Specific management for these CAs would be

to keep completely out of them to prevent the spread of seed and other propagules to other areas. Noxious weed CAs would be marked with suitable flagging and red Controlled Area tags ("flagged and tagged") prior to project layout and project implementation, and would be included on project layout and sale maps. This one small botany CA for noxious weeds comprises only a minor portion of one project treatment unit.

- **Standard Management Practices for Noxious Weeds.**

The Standard Management Requirements (SMRs) are based on the priorities established in FSM 2900 and SNFPA:

First Priority: Prevent the introduction of new invaders,
Second Priority: Conduct early treatment of new infestations, and
Third Priority: Contain and control established infestations.

a. Prevention/Cleaning: Require all off-road equipment and vehicles (Forest Service and contracted) used for project implementation to be weed-free. Clean all equipment and vehicles of all attached mud, dirt and plant parts. This will be done at a vehicle washing station or steam cleaning facility before the equipment and vehicles enter the project area. Cleaning is not required for vehicles that will stay on the roadway. Also, all off-road equipment must be cleaned prior to leaving areas infested with noxious weeds.

b. Prevention/Road Construction, Reconstruction, and Maintenance: All earth-moving equipment, gravel, fill, or other materials need to be weed free. Use onsite sand, gravel, rock or organic matter where possible.

c. Prevention/Revegetation: Use weed-free equipment, mulches, and seed sources. Avoid seeding in areas where revegetation will occur naturally, unless noxious weeds are a concern. Save topsoil from disturbance and put it back to use in onsite revegetation, unless contaminated with noxious weeds. All activities that require seeding or planting will need to use only locally collected native seed sources. Plant and seed material should be collected from as close to the project area as possible, from within the same watershed and at a similar elevation whenever possible. Persistent non-natives such as timothy, orchard grass, or ryegrass will be avoided.

This will implement the USFS Region 5 policy that directs the use of native plant material for revegetation and restoration for maintaining "the overall national goal of conserving the biodiversity, health, productivity, and sustainable use of forest, rangeland, and aquatic ecosystems."

d. Prevention/Staging Areas: Do not stage equipment, materials, or crews in noxious weed infested areas where there is a risk of spread to areas of low infestation.

e. Small infestations identified during project implementation will be evaluated and hand treated or "flagged and avoided" according to the species present and project constraints. If larger infestations are identified after implementation, they should be isolated and avoided with equipment (and equipment washed as in No. 1 above).

The following prevention measures will be implemented on the Feather River Ranger District:

- Clean all ground disturbing equipment, such as masticators, harvesters, and other off-road equipment before entering National Forest System land.
- Use weed free fill and mulch.
- Avoid staging equipment on or immediately adjacent to any of the identified noxious weed sites.
- Within mechanical treatment units, exclude all equipment from known infestations. A 25 foot "No Equipment" buffer will be placed around infestations. These areas will be identified on project maps and on the ground with day-glow orange noxious weed flagging.
- Wash equipment before leaving an infested weed unit and entering an uninfested unit. Infested units are listed in the table below.
- Pull known infestations of weeds.
- Where mulch is needed for ground cover and slash or wood chips are not available, certified weed-free straw or rice straw will be used.
- Utilize road surface gravel from weed-free sources. Pre-inspect gravel sources for the presence/absence of noxious weeds prior to utilization of gravel from those sources.

Noxious Weeds:

The Standard Management Requirements (SMRs) are based on the priorities established in FSM 2900 and SNFPA:

First Priority: Prevent the introduction of new invaders,

Second Priority: Conduct early treatment of new infestations, and

Third Priority: Contain and control established infestations.

a. Prevention/Cleaning: Require all off-road equipment and vehicles (Forest Service and contracted) used for project implementation to be weed-free. Clean all equipment and vehicles of all attached mud, dirt and plant parts. This will be done at a vehicle washing station or steam cleaning facility before the equipment and vehicles enter the project area. Cleaning is not required for vehicles that will stay on the roadway. Also, all off-road equipment must be cleaned prior to leaving areas infested with noxious weeds.

b. Prevention/Road Construction, Reconstruction, and Maintenance: All earth-moving equipment, gravel, fill, or other materials need to be weed free. Use onsite sand, gravel, rock or organic matter where possible.

c. Prevention/Revegetation: Use weed-free equipment, mulches, and seed sources. Avoid seeding in areas where revegetation will occur naturally, unless noxious weeds are a concern. Save topsoil from disturbance and put it back to use in onsite revegetation, unless contaminated with noxious weeds. All activities that require seeding or planting will need to use only locally collected native seed sources. Plant and seed material should be collected from as close to the project area as possible, from within the same watershed and at a similar elevation whenever possible. Persistent non-natives such as timothy, orchard grass, or ryegrass will be avoided.

This will implement the USFS Region 5 policy that directs the use of native plant material for revegetation and restoration for maintaining "the overall national goal of conserving the biodiversity, health, productivity, and sustainable use of forest, rangeland, and aquatic ecosystems."

d. Prevention/Staging Areas: Do not stage equipment, materials, or crews in noxious weed infested areas where there is a risk of spread to areas of low infestation.

e. Small infestations identified during project implementation will be evaluated and hand treated or "flagged and avoided" according to the species present and project constraints. If larger infestations are identified after implementation, they should be isolated and avoided with equipment (and equipment washed as in No. 1 above).

The following prevention measures will be implemented on the Feather River Ranger District:

- Clean all ground disturbing equipment, such as masticators, harvesters, and other off-road equipment before entering National Forest System land.

- Use weed free fill and mulch.

- Avoid staging equipment on or immediately adjacent to any of the identified noxious weed sites.

- Within mechanical treatment units, exclude all equipment from known infestations. A 25 foot "No Equipment" buffer will be placed around infestations. These areas will be identified on project maps and on the ground with day-glow orange noxious weed flagging.

- Wash equipment before leaving an infested weed unit and entering an uninfested unit. Infested units are listed in the table below.
- Pull known infestations of weeds.
- Where mulch is needed for ground cover and slash or wood chips are not available, certified weed-free straw or rice straw will be used.
- Utilize road surface gravel from weed-free sources. Pre-inspect gravel sources for the presence/absence of noxious weeds prior to utilization of gravel from those sources.

Fire and Fuels

All Harvest units:

- Mitigate dust from project activities by including standard dust abatement requirements in sale and project contracts (B6.33 and C5.31)

Pileburn units:

- Piled material will be no less than a 4'×4'. Work with District Fuels officer to determine unit by unit if handlines are necessary around individual piles or around perimeter of unit. Piles will be covered with a waterproof barrier on no less than 75% of the diameter of the pile.
- An agency approved Burn Plan is required on any pile burning off administrative sites.

Underburn units:

- A Smoke Management Plan approved by the local AQMD is required for all prescribed burning greater than 10 acres. An agency approved Burn Plan is required prior to any understory burning.

Heritage Resources

Project Area:

- Apply standard resource protection measure identified within Appendix E of the 2013 *Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), the California State Historic Preservation Officer, the Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forest of the Pacific Southwest Region.* The use of these stand protection measures means that no project activity will take place within the archaeological sites, and thus there will be no effect to the sites under any of the proposed alternatives.

- Flag and avoidance of sites.
- A map showing the location of all sites in the project area will be provided to the Forest Service project manager.
- Sites will be monitored during and after the project.
- If additional heritage resources are identified during project activities, all work shall stop in that area until the District Archaeologist assesses the situation.

All prescribed burning units:

- Historic sites must have fire lines placed around them so they are not burnt over.

Hydrology/Soils/Aquatics

Hydrology/Soils

Streamside Management Zone Plan and Resource Objectives:

This plan describes goals, objectives and treatments for all streamside and riparian zones within the project area that would be impacted by management activities. As required by the amended 1988 Plumas Land and Resource Management Plan, this plan also identifies the vegetative treatments within riparian and streamside areas and the maximum amount of vegetation manipulation allowable to meet the stated objectives.

In addition, the maximum area of soil exposure allowable is identified, as well as the necessary erosion control measures to meet the stated objectives. This plan also assesses those areas "... within the SMZ having oversteepened slopes (over 60 percent) with a very high erosion potential or high instability, and procedures to limit soil disturbance to no more than 5 percent of these areas per decade." Specific prescriptions for roads, skid trails, landings and other harvesting facilities are referenced and opportunities and procedures for restoration of deteriorated watershed conditions are presented.

Alternative B: Riparian Habitat Conservation Areas and Streamside Management Zones:

The widths of Riparian Habitat Conservation Areas (RHCAs) were determined under the provisions of the Herger-Feinstein Quincy Library Group Forest Recovery Act Final Environmental Impact Statement (HFQLG FEIS) (USDA Forest Service, 1999). These guidelines were applied on the ground, and RHCAs were flagged as no-equipment zones.

The HFQLG FEIS Glossary defines these terms:

1. A perennial stream is a stream or portion of a stream that flows throughout the year. The groundwater table lies above the bed of the stream at all times.
2. An intermittent stream is any non-permanent flowing drainage feature having a definable channel and evidence of annual scour and deposition, including ephemeral

streams with a definable channel and evidence of annual scour or deposition.

3. An ephemeral stream is a stream that contains running water only sporadically, such as during and following storm events. Ephemeral streams with a definable channel are considered "seasonally flowing" or intermittent when they show evidence of annual scour or deposition. Ephemeral streams without a definable channel are considered swales.

4. An ephemeral stream/swale is a shallow, trough-like depression in the landscape that may be hydraulically connected to stream channels downslope. Swales are sometimes referred to as those ephemeral channels having an undefined channel and no evidence of scour or deposition. Upslope precipitation, as rainfall or snowmelt, is generally concentrated in swales and directed towards definable stream channels as subsurface flow.

Scientific Analysis Team (SAT) Guidelines Table 5-4 (also HFQLG FEIS Table 2.15) defines how to delineate "interim boundaries" of RHCAs for different water bodies.

The prescribed minimum widths as "interim boundaries" in RHCAs are:

5. 300 feet (perennial fish bearing streams and lakes),

6. 150 feet (perennial non-fish bearing streams, ponds, wetlands greater than 1 acre, and lakes), and

7. 100 feet (intermittent and ephemeral streams, wetlands less than 1 acre, and landslides). Features to in RHCA determination, (whichever is greatest) are: (1) top of inner gorge, (2) 100-year floodplain, (3) Outer edge of riparian vegetation, and (4) A distance equal to one or two tree heights.

The average height of a site potential tree has been determined to be 150 feet on the Feather River Ranger District. This means a 150-foot RHCA buffer width is applied to seasonally flowing streams (intermittent or ephemeral) that have a definable channel and evidence of annual scour and deposition, instead of a 100 foot RHCA buffer.

Allowable Treatment within RHCAs (Applies to Alternative B):

Riparian Habitat Conservation Areas (RHCAs): Overall widths, per SAT guidelines, are 150' for non-fish bearing and 300' for fish bearing on each side of stream.

- Groups Selection, Mechanical Thinning and Radial Thinning: Maintain standard RHCAs. These treatments by mechanical equipment would not occur within the full width of RHCAs. 150' for non-fish bearing and 300' for fish bearing on each side of stream.

- Mastication: Apply a 25' buffer for SMZs, a 50' buffer for all non-fish bearing streams and a 75' buffer for fish bearing streams.

- Handcut/Pile/Burn (HCPB): No buffer on all ephemeral streams, but retain at least 50% canopy cover and all riparian vegetation post treatment. Piles should be at least 25' from edge of stream. Apply a 25' buffer to all other non-fish bearing streams and a 50' buffer to fish bearing streams.

- Handcut/Grapple Pile (HCGP): 50' buffer for ephemeral streams, 75' for all other non-fish bearing and 100' for fish bearing streams.

- Underburns (UB): Use RHCA widths, but buffer is not a no-treatment buffer. Fire ignition would be prohibited within the buffer, but would be allowed to back into the buffer.

Alternatives C and D: Riparian Conservation Areas:

The Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD) - The standard and guide for Riparian Conservation Area (RCA) widths are described below. RCA widths shown below may be adjusted at the project level if a landscape analysis has been completed and a site-specific Riparian Conservation Objectives (RCO) analysis demonstrates a need for different widths.

- Perennial Streams: 300' on each side of the stream, measured from the bank full edge of the stream

- Seasonally Flowing Streams (includes intermittent and ephemeral streams): 150' on each side of the stream, measured from the bank full edge of the stream

- Streams in Inner Gorge1: top of inner gorge

- Special Aquatic Features or Perennial Streams with Riparian Conditions extending more than 150' from edge of streambank or Seasonally Flowing streams with riparian conditions extending more than 50' from edge of streambank: 300' from edge of feature or riparian vegetation, whichever width is greater

- Special Aquatic Features include: lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs

- Other hydrological or topographic depressions without a defined channel: RCA width and protection measures determined through project level analysis.

Allowable Treatment within RCAs (Applies to Alternatives C and D):

- Mechanical Thinning and Radial Thinning: 150' for non-fish bearing and 300' for fish bearing on each side of stream.

- Mastication: Apply a 25' buffer for SMZs, a 50' buffer for all non-fish bearing streams and a 75' buffer for fish bearing streams.

- Handcut/Pile/Burn (HCPB): No buffer on all ephemeral streams, but retain at least 50 percent canopy cover and all riparian vegetation post treatment. Piles should be at least 25' from edge of stream. Apply a 25' buffer to all other non-fish bearing streams and a 50' buffer to fish bearing streams.

- Handcut/Grapple Pile (HCGP): 50' buffer for ephemeral streams, 75' for all other non-fish bearing and 100' for fish bearing streams.

- Underburns (UB): Use RCA widths, but buffer is not a no-treatment buffer. Fire ignition would be prohibited within the buffer, but would be allowed to back into the buffer.

All treatment units:

- Standard resource protection measures for hydrology and fisheries resources.

- Timber Sale Planning Process – Incorporate water quality and hydrological considerations into the timber sale planning process.

- Timber Harvest Unit Design – Timber harvest unit design will secure favorable conditions of water quality and quantity while maintaining desirable stream channel characteristics and watershed conditions.

- Determination of Surface Erosion for Timber Harvest Unit Design – Identify high erosion hazard areas in order to adjust treatment measures to prevent downstream water quality degradation.

- Use of Sale Area Maps and/or Project Maps for Designating Water Quality Protection Needs – Recognition and protection of areas related to water quality protection delineated on sale area maps or project map.

Streamside Management Zone (SMZ) – Protect ephemeral stream channels without evidence of annual scour:

- For channels with a slope less than 60 percent a 25' buffer on each side is applied.

- Unstable channel slopes or channel slopes greater than 60 percent a 50' buffer on each side is applied.

- In all treatment units with ground-based mechanical equipment, equipment may reach into SMZs in the identified no-tractor equipment zone. Retain trees along streambanks.

- TM-1: Prohibit scheduled timber harvest, including fuelwood cutting, in RHCAs or RCAs.

- Management activities in RHCAs must contribute to improving or maintaining watershed and aquatic habitat conditions described in the Riparian Management Objectives. When activities are found to detract from meeting RMOs, those activities will be modified, rescheduled, or discontinued. Areas where riparian conditions are presently degraded, management activities must be designed to improve habitat conditions.

- FM-1 – Design fuel treatment to meet RMOs or RCOs and to minimize disturbance of riparian ground cover and vegetation.

- FM-4 – Design prescribed burn projects to protect RHCAs or RCAs from burning. Where riparian ecosystems would be enhanced by prescribed burns, clearly identify the specific objectives and risks.

- Protection of Wetlands – Avoid adverse water quality impacts associated with destruction, disturbance, or modification of wetlands. The Forest Service will not permit the implementation of activities and new construction in wetlands whenever there is a practical alternative.

- Cumulative Off-Site Watershed Effects – Protect the identified beneficial uses of water from the combined effects of multiple management activities which individually may not create unacceptable effects but collectively may result in degraded water quality conditions.

Temporary road locations, Haul Routes, Road Reconstruction, and Stream Crossing Upgrade or Removals:

- Standard resource protection measures for hydrology and fisheries resources.

- General Guidelines for the Location and Design of Roads – Locate and design roads with minimal resource damage.

- RF-8 – Require a Road Management Plan be developed and carried out that meets the RMOs.

- Erosion Control Plan – Limit and mitigate erosion and sedimentation through effective planning prior to initiation of construction activities and through effective contract administration during construction.

- Timing of Construction Activities – Minimize erosion by conducting operations during minimal runoff periods.

- Stabilization of Road Slope Surfaces and Spoil Disposal Areas – Minimize erosion from exposed cut slopes, fill slopes, and spoil disposal areas.

- Road Slope Stabilization Construction Practices – Reduce sedimentation by minimizing erosion from road slopes and slope failure along roads.

- Dispersion of Subsurface Drainage From Cut and Fill slopes – Minimize the possibilities of cut or fill slope failure and the subsequent production of sediment.

- Control of Road Drainage – Minimize the erosive effects of water concentrated by road drainage features; disperse runoff from disturbances within the road clearing limits; to lessen the sediment yield from roaded areas; minimize erosion of the road prism by runoff from road surfaces and from uphill areas.

- Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects – Minimize erosion and sedimentation from disturbed ground on incomplete projects.

- Construction of Stable Embankments (Fills) – Construct embankments with materials and methods, which minimize the possibility of failure and subsequent water quality degradation.

- Control of Sidecast Material During Construction and Maintenance – Minimize sediment production originating from sidecast material during road construction or maintenance.

- Servicing and Refueling of Equipment – Prevent pollutants such as fuels, lubricants, bitumens and other harmful materials from being discharged into or near rivers, streams and impoundments, or into natural or man-made channels.

- Control of Construction and Maintenance Activities Adjacent to SMZs – Protect water quality by controlling construction and maintenance actions within and adjacent to any streamside management zone.

- Bridge and Culvert Installation – Minimize sedimentation and turbidity resulting from excavation for in-channel structures.

Ensure that organic debris generated during road construction is kept out of streams so that channels and downstream facilities are not obstructed.

- Ensure debris dams are not formed which obstruct fish passage, or which could result in downstream damage from high water flow surges after dam failure.

- Specifying Riprap Composition - minimize sediment production associated with the installation and utilization of riprap material.

- Water Source Development Consistent with Water Quality Protection – Supply water for roads and fire protection while maintaining existing water quality.

- Maintenance of Roads – Maintain roads in a manner which provides for water quality protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities all of which can cause erosion and sedimentation, and deteriorating watershed conditions.

- Road Surface Treatment to Prevent Loss of Materials – Minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas.

- Traffic Control During Wet Periods –

  – Reduce road surface disturbance and rutting of roads

  – Minimize sediment washing from disturbed road surfaces.

All treatment units:

- Standard resource protection measures for hydrology and soil resources.

- Determining Tractor Loggable Ground – Minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems.

- Tractor Skidding Design – Design skidding patterns to best fit the terrain, the volume, velocity, concentration, and to control direction of runoff water in a manner that will minimize erosion and sedimentation.

- Log Landing Location – Locate new landings or reuse old landings in such a way as to avoid watershed impacts and associated water quality degradation.

- Erosion Prevention and Control Measures During Timber Sale Operations – Ensure that the purchasers' operations will be conducted reasonably to minimize soil erosion.

- Log Landing Erosion Control – Reduce the impacts of erosion and subsequent sedimentation associated with log landings by use of mitigating measures.

- Erosion Control on Skid Trails – Protect water quality by minimizing erosion and sedimentation derived from skid trails.

- Erosion Control Structure Maintenance – Ensure that constructed erosion control structures are stabilized and working.

- Acceptance of Timber Sale Erosion Control measures Before Sale Closure – Ensure the adequacy of required erosion control work on timber sales. The effectiveness of soil erosion prevention and control measures is determined by the conditions found after sale areas have been exposed for one, or more years to the elements as determined by the sale administrator.

- Soil Disturbing Treatments on the Contour – decrease sediment production and stream turbidity while mechanically treating slopes. This is a preventive measure that limits surface disturbance activities to preclude water from concentrating by providing means of adequate infiltration and by decreasing the velocity of surface runoff so that infiltration is enhanced.

- Slope Limitations for Mechanical Equipment Operation – reduce gully and sheet erosion and associated sediment production by limiting tractor use.

- Tractor Operation Limitation in Wetlands and Meadows – Limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion by excluding the use of mechanical equipment in wetland and meadows except for the purpose of restoring wetland and meadow function.

- Revegetation of Surface Disturbed Areas – Protect water quality by minimizing soil erosion through the stabilizing influence of vegetation foliage and root network. This is a corrective practice to stabilize an otherwise unstable soil surface during vegetation manipulation projects. The plant species selected will be a mix best suited for site conditions and attainment of multiple management objectives for the area.

- Soil Moisture Limitations for Mechanical Equipment Operations – Use to prevent compaction, rutting, and gullying, with resultant sediment production and turbidity.

Units with underburn or pile burn treatments:

- Standard resource protection measures for hydrology and soil resources for prescribed burning treatments.

- Fire and Fuel Management Activities – Reduce public and private losses and environmental impacts which result from wildfires and/or subsequent flooding and erosion by reducing or managing the frequency, intensity and extent of wildfire.

- Consideration of Water Quality in Formulating Fire Prescriptions – Provide for water quality protection while achieving the management objectives through the use of prescribed fire.

- Protection of Water Quality from Prescribed Burning Effects – Maintain soil productivity, minimize erosion, and minimize ash, sediment, nutrients, and debris from entering water bodies.

- Minimizing Watershed Damage from Fire Suppression Efforts – Avoid watershed damage in excess of that already caused by the wild fire. Avoid heavy equipment operation on fragile soils and steep slopes whenever possible.

- Repair or Stabilization of Fire Suppression Related Watershed Damage – Stabilize all areas that have had their erosion potential significantly increased, or their drainage pattern altered by suppression related activities. Treatments for fire-suppression damages include, but are not limited to, installing water bars and other drainage diversions in fire roads, firelines, and other cleared areas; seeding, planting and fertilizing to provide vegetative cover; spreading slash, or mulch to protect bare soil; repairing damaged road drainage facilities; clearing stream channels or structures and removing debris deposited by suppression activities which can have adverse life, property and environmental impacts.

- Control of Construction and Maintenance Activities Adjacent to SMZs – Protect water quality by controlling construction and maintenance actions within and adjacent to any streamside management zone.

- Bridge and Culvert Installation – Minimize sedimentation and turbidity resulting from excavation for in-channel structures.

- Ensure that organic debris generated during road construction is kept out of streams so that channels and downstream facilities are not obstructed.

- Ensure debris dams are not formed which obstruct fish passage, or which could result in downstream damage from high water flow surges after dam failure.

- Specifying Riprap Composition - minimize sediment production associated with the installation and utilization of riprap material.

- Water Source Development Consistent with Water Quality Protection – Supply water for roads and fire protection while maintaining existing water quality.

- Maintenance of Roads – Maintain roads in a manner which provides for water quality protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities all of which can cause erosion and sedimentation, and deteriorating watershed conditions.

- Road Surface Treatment to Prevent Loss of Materials – Minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas.

- Traffic Control During Wet Periods –

  – Reduce road surface disturbance and rutting of roads

  – Minimize sediment washing from disturbed road surfaces.

Recreation/Scenery/Lands/Minerals

- Dispose of slash outside the visual foreground of major roadways, neighborhoods, recreation areas/site and authorized special uses.
- Flush Cut stumps within the visual foreground (approximately 25') of major roadways, neighborhoods and recreation areas/sites.
- Restore the surface of the ground, disturbed by yarding, mastication, tractor pilling and other mechanical operations within the visual foreground (approximately 100') of major roadways, neighborhoods/communities, and recreation areas/sites.
- Protect access to private properties, and uses authorized under special use permit or active mining operations.
- Avoid cull decks or landings within the visual foreground (approximately 100') as seen from major roadways, neighborhoods or recreation sites.
- Do not yard cull logs to decks within approximately 100' of major roadways, neighborhoods, or recreation sites.
- Protect all overhead utility lines and underground utilities by establishing a clear, avoidance area of 100' from centerline of line or corridor
- Protect any improvements within road right of ways.
- Recreational use of project area should be limited during implementation phase.
- Avoid flagged areas to protect motorized and non-motorized trails, trailheads, permitted special uses.

Silviculture/Vegetation

All standard contract practices would be applied (timber sale contract B provisions) as would some additional C-provisions and site specific prescription mitigations. Recommended mitigations associated with vegetation management would be designed to reduce logging damage to residual trees, reduce fuels, and reduce opportunities for infection of trees by insects or disease.

Apply to mechanical treatments as follows: (1) minimize logging in the Spring when bark is loose and trees are more susceptible to logging wounds, (2) remove small trees damaged beyond repair in harvesting operations, (3) no removal of specially-identified trees (e.g., marked survey trees, genetically superior trees and proven rust resistant trees, (4) canopy cover would be measured during project implementation to confirm a minimum forest stand average of 40 percent canopy cover (CWHR Size Classes 5M, 5D and 6).

Project Area:

- No removal of specially identified trees(e.g., marked survey trees, superior gene trees, and rust resistant sugar pine

- All standard management practices would be applied (B provisions) as would some additional C provisions and site specific prescriptions. Recommended mitigations include removal of small trees damaged beyond repair during harvesting in thinning units.

- Canopy Cover would be measured during project implementation (sale administrator or harvest inspector) to confirm a minimum of 40 percent canopy cover in fuels treatment zones.

Soils

If a unit does not have adequate effective soil cover post-treatment then vegetative soil cover and stabilization mitigation would be applied per specified contract provisions.

To further reduce the risk of thinning treatments causing detrimental compaction, a Limited Operation Period (LOP) would be applied to the entire project. The LOP would allow ground-based harvest equipment to operate only when soils are considered dry. Soil in the 8 inches below the ground surface is defined as "dry" when it is not sufficiently moist to allow a soil sample to be squeezed and hold its shape, or when the squeezed sample crumbles when the hand is tapped. Dryness would be determined by the sale administrator along with the recommendation of district watershed staff.

Wildlife

C-Clauses:

- C6.24-B6.24 – Protection of Habitat of TEPS Species (10/78): Location of areas needing special measures for protection of animals (or plants) as Threatened, Endangered, Proposed or species under the ESA of 1973 and R5 Sensitive Species are shown on map and or discussed in this document.

- If protection measures prove inadequate, if other such areas are discovered, or if new species are listed on the Endangered Species List, FS may either cancel under C8.2 or unilaterally modify this contract to provide additional protection regardless of when such facts become known. Discovery of such areas by either party shall be promptly reported to the other party.

- CT6.313 – Limited Operating Period (1/84): Except when agreed otherwise, Purchaser's operations shall be "limited" as described within this document.

- C6.7 – C6.705 Logs not meeting utilization standards shall be used to meet the Land and Resource Management Plan as amended requirements. Logs should be evenly distributed within the units (stands) to the extent possible.

- If new TEPS species are listed or discovered within an area in which they may be adversely affected by activities, protection measures such as LOPs will be implemented as recommended by a qualified biologist, as appropriate for the species. The dates and reason for delaying harvest should be included in C6.313 Limited Operating (1/84), or other language that is appropriate for the type of contract.

Limiting Operating Periods:

- LOPs are designed to reduce potential harm/harassment to wildlife during critical seasons, primarily nesting and their offspring seasons, when animals are most vulnerable to activities (running equipment, timber harvest, and hauling, burning, operating chainsaws/brush cutters) that could result in failed nesting attempts.

- If management objectives cannot be met by implementing the LOPs identified, a qualified wildlife biologist will be consulted to determine more specific areas and kinds of activities that may be pursued. The biologist may recommend removing LOPs, if sufficient information is provided by additional surveys or new information arises.

- If potential raptor nests, large stick nests, or signs of active denning are observed in or near trees that are designated for removal, the occurrence and location should be reported to a wildlife biologist to determine the need for further review. During marking of the timber sale, potential raptor nest trees will be identified and reported to the District Wildlife Biologist.

- Implement BMPs to ensure water quality standards are met and riparian and upslope conditions are maintained or improved. Effectiveness monitoring of all applicable BMPs should occur.

Snags and Large Down Wood:

The following recommended Standards and Guidelines from Table 2 (page 69) of the 2004 SNFPA ROD will be followed for this project:

- Within westside vegetation types, generally retain an average over the treatment unit of 10–15 tons of large down wood per acre (equivalent to 8–12 logs per acre ≥ 20-inch dbh and 10 foot in length or longer).

- In westside mixed conifer and ponderosa pine types, retain four to six of the largest snags per acre.

- Use snags larger than 15 inches dbh to meet the above guidelines.

Prescribed burns:

- During implementation of under burning, no ignitions should occur within RHCA/RCAs. Active ignition within the RHCA/RCA may occur with the Aquatic biologist or the Hydrologist approval when deemed beneficial to the RHCA/RCA. Fire should be allowed to back into an RHCA/RCA to achieve low intensity burning. All burning should be conducted on permissive burn days, within air quality constraints. Fire lines (control lines) include roads, skid trails, natural barriers and hand or machine lines (ATV or tractor). Hand line construction may occur within RHCA/RCAs, where it is necessary to enter the RHCA/RCA to provide for logistical boundaries in underburning the fuel treatment zones.

- The underburns would be ignited outside of RHCA/RCA buffers but allowed to backburn down into the RHCA/RCAs. These underburns could be conducted when burning prescriptions are met during the year for the majority of the project treatments, however for Unit 216, 213,210 and 209 a Limited Operating Period (LOP) of no activity from October 1, or the first wetting rain (more than 1/4 inch precipitation), until April 15th.

Threatened, Endangered and Sensitive Species:

The following lists management requirements for Threatened, Endangered and Sensitive Species (TES), including the LRMP Standards and Guidelines (as amended by the SNFPA FSEIS/ROD), which are incorporated into the project proposal. These actions must be implemented in full for determination statements to be valid.

California Red-legged Frog, Foothill Yellow-legged Frog, Western Pond Turtle, and Hardhead Minnow:

- Limited Operating Period (LOP): no activity from October 1, or the first wetting rain (more than 1/4 inch precipitation), until April 15th. From April 15 to October 1, if a weather system resulting in more than 1/4 inch of precipitation occurs in project area, operations must be suspended until a dry period of 72 hours occurs, unless the district biologist determines there will be no effect to frogs.

- Slash piles within RCAs shall not be burned during the LOP, and when burned, should be burned with the provisions that (1) fuel not be dumped on the pile, but rather use fuse's or light with a single propane torch, and (2) piles will be burned from a single location rather than multiple locations, allowing a sheltering frog to escape.

- Best Management Practices (BMPs) should be applied that re-distribute soil and debris to pre-treatment landscape contours to minimize sedimentation to creeks (see Hydrology Report 2012).

- Locate and manage water-drafting sites to minimize adverse effects on sedimentation, instream flows required to maintain riparian resources, and channel condition. See "Water Draft Site Development Plan" for specific standards and recommendations.

- Designate road crossings, springs and water sources for dust abatement. These should be checked by a wildlife biologist for presence of sensitive frog or fish species prior to project implementation. Apply protection measures as appropriate.

California Spotted Owl:

- Seasonal restrictions apply for unit treatments including road access from March 1 through August 15 within a 1/4 mile of the designated activity centers.

- If owls are located a LOP (March 1 through August 15) will be required for treatment units where activity centers (nests, pair, young) have been located within 1/4 mile of the treatment unit.

- If owls are located the LOP may be added or modified for this project by the district wildlife biologist. Stand prescriptions may be adjusted as well (an example might be to have no harvest around the nest tree, etc.).

- A new Protected Activity Center (PAC) and Home Range Core Area (HRCA) will be created if a new territory is discovered.

Northern Goshawk:

- Seasonal restrictions apply for unit treatments including road access from March 1 through September 15 within a 1/4 mile of the designated activity centers.

- If goshawks are located a LOP (March1 through September 15) will be required for treatment units where activity centers (nests, pair, young) have been located within 1/4 mile of the treatment unit.

- If goshawks are located the LOP may be added or modified for this project by the district wildlife biologist. Stand prescriptions may be adjusted as well (an example might be to have no harvest around the nest tree, etc.).

- A new PAC would be created if a resident, pair or nest is discovered.

Pallid Bat and Western Red Bat:

If a roost is found, project activities will be modified to avoid impacts to bat species or a LOP (no activity May 15 to August 15, or as otherwise determined) may be applied during the breeding season. The District Wildlife Biologist will be contacted if any suspected or known bat roosts are located during project activities. If a roost is found, do not pile slash/burn piles, around the roost If goshawks are located a LOP (March 1 through September 15) would be required for treatment units where active nests sites have been located within 1/4 mile. The LOP may be added or modified for this project by the district wildlife biologist. Stand prescriptions may be adjusted as well (an example might be to have no harvest around the nest tree, etc.).

A6-2. Monitoring Strategy

This section of the appendix discusses two stages of monitoring: implementation and effectiveness. Implementation monitoring determines the degree and extent to which application of standards and guidelines and mitigation measures meet management direction and intent. Effectiveness monitoring is used to determine the degree to which implemented resource management activities met objectives. The effectiveness of standards, guidelines, or mitigations cannot be assessed without first confirming that those standards and guidelines were actually implemented. Information from monitoring will help guide future activities and/or adjust current management practices.

Overall goals of monitoring activities will be to:

1. Provide information useful to managers applying the principles of adaptive management.
2. Assist the public in gauging the success of implementing the resource management activities as designed.
3. Assess the effectiveness of the resource management activities in achieving resource objectives.

The following monitoring activities address the purpose and need of the Sugarloaf Hazardous Fuels Reduction Project. In order to do so, post-implementation assessment will be project specific. The following efforts will take place during project implementation and after completion of project activities.

Botanical Resources Monitoring

<u>Implementation Monitoring</u>

Implementation monitoring will begin in the year following project implementation. The objective will be to answer the following two questions:

1. Were Threatened, Endangered, and Sensitive (TES) plants surveyed and protected?
2. Were noxious weed introductions prevented and existing infestations suppressed?

Effectiveness Monitoring

Effectiveness monitoring will begin three years after project implementation. The objective will be to answer the following four questions:

1. How do TES plant species respond to resource management activities? Randomly selected units without TES plants will also be selected to determine if any new TES plant occurrences have occurred in response to management activities.

2. Where existing infestations of noxious weeds eliminated or contained?

3. Were all new infestations of noxious weeds eliminated or did some become established?

4. Did new infestations of noxious weeds occur during or following project implementation?

A sample pool of botanical sites will be developed to address each of the above questions. The number of sites in each sample pool would be limited to 30, and if that limit is exceeded, then the sites to be monitored will be chosen randomly. If the limit is not reached, then every site in the pool will be monitored. The monitoring will be done by forest service botanists who will conduct field visits, and record and analyze the results.

Sampling will consist of photo plots established to monitor mastication, thinning, and prescribed fire in areas with botanical concerns. These will be established with fuels and botany personnel and reread jointly.

Canopy Cover Retention Monitoring

Implementation Monitoring

Canopy cover (CC) plays a vital role in ecosystem processes and wildlife habitat. CC monitoring will occur periodically during project implementation to assess forest stand canopy cover retention in CWHR size classes 4D, 4M, 5M, 5D, and 6, designed to maintain a minimum stand average CC of 40 percent.

CC sampling will be done using the GRS densitometer. This common CC sampling tool is also used by the California Department of Fish and Game. Since Forest Service management direction measures wildlife in terms of CWHR specifications set by the California Department of Fish and Game, application of the densitometer will lend to overall consistency in management.

Depending upon the size of the area being surveyed, the number of sample points may vary. The goal of sampling will be to cover an area thoroughly without over-sampling. CC will be calculated using the following formula:

$$(\text{canopy hits} / \text{sample points}) \times 100 = \text{percent canopy cover}$$

where:

"canopy hits" is the vertical interception of crown cover with the crosshairs as viewed through the densitometer.

Fuel Treatment Zone Monitoring

B. Project-level Fuel Treatment Zone Monitoring

Fuel Treatment Zone monitoring will not begin for about 5 years after construction has been completed, depending upon funding (see "C. No Fuel Treatment Zone Maintenance" under the "Fuel Treatment Zone Maintenance" section below), because fuel treatment zone effectiveness will not be seriously reduced for approximately 5 to 10 years in plantations and 10 to 20 years in natural stands.

A fuel treatment zone monitoring program will be completed at 2- to 3-year intervals for the Sugarloaf Hazardous Fuels Reduction Project area until the fuel treatment zone is no longer needed or funding is no longer available (see "B. Long-Term (Future) Fuel Treatment Zone Maintenance" under the "Fuel Treatment Zone Maintenance" section below). The Forest Service will fully comply with the Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act requirements prior to conducting any maintenance activities.

C. Fuel Treatment Zone Site-Specific Monitoring Criteria

The objectives for fuel treatment zones include retaining surface fuels less than 3 inches in diameter and around 5 tons per acre and retaining large down woody material, where available, at 10 to 15 tons per acre, after treatment.

When both surface fuels (needles, twigs, branches) and fuel ladders (shrubs, brush, understory trees) exceed predetermined levels (see table A6-1), then DFPZ maintenance treatments may be evaluated and scheduled (see "Short- or Long-Term Fuel Treatment Zone Maintenance" under the "Fuel Treatment Zone Maintenance" section below) on a site-specific basis. The priorities for fuel treatment zones and prescriptions are (1) stands that meet both surface fuels and fuel ladder criteria, (2) stands that meet the surface fuel criteria, and (3) stands that meet the fuel ladder criteria.

Table A6-1. Fuel Treatment Zone monitoring criteria.

Surface Fuels	Treat If Surface Fuels Exceeds:	Retain After Treatment
0–3 inch diameter	Greater than (>) 7 tons per acre	Around 5 tons per acre
Large down wood	> 15 tons per acre	10–15 tons per acre
Fuel Ladder	Treat if Fuel Ladder Exceeds:	Fuel Height
Shrubs/brush	> 25 percent ground cover	> 5 feet
Understory trees	> 15 percent canopy cover	> 8 feet

Prescribed Fire Monitoring

Photo plot implementation and effectiveness monitoring

Some plots will be placed in and near areas of special botanical resource concern. The remaining plots will be placed in random areas in units with high fuel loading to show fire behavior, consumption, and retention. Plots will also be established in random units throughout the fuel treatment zones to show effectiveness of all the different fuel treatments and mastication. Different treatments include, thinning /underburn, handcut/pile and burn.

The Fuels Officer will determine the photo plot location before burn plan development. GPS will be used to mark and establish plots for photo monitoring. Photos will be taken as the flaming front is passing through the plot area.

Different angles might be taken to best illustrate fire behavior. Plots will be revisited one to two days after ignition to compare and contrast consumption and scorch. Revisits to plots will occur one, three, and five years after ignition. Photos will be taken to illustrate scorch, mortality, and regeneration.

Features that will be recorded with photos as follows:

- Pre-burn – to show existing fuel conditions
- Photos during ignition – to show fire intensity/behavior
- Postburn – taken 1–2 days post ignition to show burn accomplishments (consumption, scorch)
- Postburn – taken 1, 3, 5 years post ignition to show accomplishments and effects of fire behavior (scorch, mortality, regeneration).

Heritage Resources Monitoring

Monitoring during project implementation, in conjunction with other measures, may be used to enhance the effectiveness of the protection measures summarized below.

- All proposed activities, facilities, improvements, and disturbances shall avoid heritage resource sites. Avoidance means that no activities associated with the project that may affect heritage resource sites shall occur within a site's boundaries, including any defined buffer zones. Portions of the project may need to be modified, redesigned, or eliminated to properly avoid heritage resource sites.
- All heritage resource sites within the area of potential effect shall be clearly delineated prior to implementing any associated activities that have the potential to affect heritage resource sites.
- Buffer zones may be established to ensure added protection where the Forest or District Archaeologist determines that they are necessary. The size of buffer zones needs to be determined by the Forest or District Archaeologist on a case-by-case basis.

When any changes in proposed activities are necessary to avoid heritage resource sites (e.g., project modifications), these changes shall be completed prior to initiating any activities.

Roads and Logging Systems Monitoring

Logging Systems activities fall under the Best Management Practices Evaluation Process.

The goals of this monitoring plan are as follows:

- Collect information to help guide future harvest implementation and adjust current management requirements, if needed
- Assist the public in gauging the success of Forest Service management requirements in reducing the erosion impacts to the environment
- Assess the effectiveness of resource planning to achieve minimal soil erosion.

Implementation monitoring: measures the degree or extent the standard management requirements meet the specified direction. Best Management Practices (BMPs) and "B" and "C" timber sale contract provisions are the mitigation requirement tools used to ensure soil erosion is kept to a minimum. BMP standards for implementation are to be compared to on-the-ground results with an ultimate objective of 100 percent attainment. Results for any BMP that fall below 85 percent will trigger an activity review. The items to be evaluated for Logging Systems are as follows:

Streamside Management Zones (SMZs) = BMPs 1.8 and 1.19.

Skid Trails = BMPs 1.9, 1.10, 1.11, 1.12, 1.13, 1.17, 1.20 and 1.21.

Landings = BMPs 1.12, 1.13, 1.14, 1.16, 1.20 and 1.21.

Temporary Roads = BMPs 1.13, 1.14, 1.20 and 1.21.

Road Decommissioning = BMP 2.26.

Effectiveness monitoring measures the degree to which the resource activities (harvesting near Streamside Management Zones (SMZs), building or using existing skid trails, landings, temporary roads and road decommissioning) will meet the BMP erosion control features. The tilling machine that travels over the top of the constructed water bars can seriously affect the long term effectiveness. Water bars need to be constructed to a height sufficient to survive the tilling process and still function properly.

Locations and Frequency: At the implementation monitoring stage, a random sample of units will be developed at the end of each year. From these samples, a representative number of units will be selected for evaluation. At the effectiveness monitoring stage, an assessment will follow one to three years behind the implementation monitoring at the same site location to assure the erosion control features will continue to function for the long term.

Monitoring for Cumulative Watershed Effects

Implementation Monitoring. Implementation and effectiveness monitoring for cumulative watershed effects are currently accomplished through the Best Management Practice Effectiveness

Evaluation Process. The objective is for BMP implementation to be at 100 percent. Results for any BMP below 90 percent trigger a review of the activity area before implementation of further projects. Implementation monitoring is achieved by selecting a representative number of treatment units each year from a sample pool of completed stands or project areas.

Across the HFQLG Pilot Project area, 30 evaluations were made each year of stream protection zones (T01), skid trails (T02), landings (T04), roads and stream crossings (E08 and E09), road decommissioning (E10), and prescribed burns (F25). These results were summarized and reported annually. Effectiveness monitoring (see below) would be conducted at the same sites. When portions of the Sugarloaf Hazardous Fuels Reduction Project are completed, they will be entered in the sample pool for the year of completion (or sometimes the following year, depending on the BMP to be evaluated), and may be chosen for evaluation.

Effectiveness Monitoring. The purpose of effectiveness monitoring is evaluate whether the implementation of the project meet resource objectives. There are a few resource objectives for watershed and aquatics. The following questions are project specific to the Sugarloaf Hazardous Fuels Reduction Project. *What is the effect of activities on indicators of watershed condition? Attributes of disturbance levels are to be tracked with respect to pre- and post-project conditions*. These include road density, near-stream road density, equivalent roaded acres (ERA), near-stream ERA, and number of road-stream crossings. These data are reported for the Sugarberry Project in the Hydrology Report.

Are Best Management Practices applied during project activities effective in meeting onsite objectives? The objective is 100 percent BMP effectiveness. Results for any BMP below 90 percent trigger a review of the activity area before implementation of further projects. Sites with poor effectiveness will be reviewed promptly for remediation.

The sample pool selected for implementation monitoring will also be evaluated for BMP effectiveness. When portions of the Sugarberry project are completed, they will be entered in the sample pool for the year of completion (or sometimes the following year, depending on the BMP to be evaluated), and may be chosen for evaluation. The recent Region 5 amendment to the Forest Service Handbook for water quality management indicates Forests should strive to achieve BMP effectiveness rates of 90% to 95% (USDA Forest Service 2011).

Sampling Design

Sites to be evaluated are identified by random or non-random sampling selection procedures. The random selection process for monitored sites involves looking at projects in the Feather River Ranger District. Within the selected project, randomly selected units that meet certain issues deemed appropriate by the hydrologist are then designated for monitoring. If the unit does not require monitoring, another is chosen within the project area. Randomly identified sites are very important for drawing statistical conclusions on the implementation and effectiveness of BMPs. Non-randomly selected sites allow for direct monitoring of management practice effectiveness within an area that may have an elevated level of Threshold of Concern. Non-randomly selected sites are clearly identified and kept separate from the randomly selected sites by the Forest Hydrologist during data storage and analysis.

Non-randomly selected sites are identified in various ways as follows:

- Identified as part of a monitoring plan prescribed in an environmental assessment, environmental impact statement, or a land and resource management plan.
- Identified as part of a settlement or negotiated agreement.
- Part of a routine site visit.
- Sites that are of particular interest to site administrators, specialists and/or management due to their sensitivity, uniqueness, and so forth.
- Selected for a particular reason specific to local needs.

Soils Monitoring

Treatment units 002A and 002B would be monitored for effective soil cover post implementation under alternatives B and D.

Water Quality Monitoring

Implementation monitoring: is required in order to assess the extent to which activities are implemented according to the ROD. With respect to watershed resources, this is comprised of the Best Management Practices Evaluation Program (BMPEP). The question to be answered is: "Are BMPs implemented during project activities?" The objective is for BMP implementation to be at 100 percent. Results for any BMP below 90 percent will trigger a review of the activity area before implementation of further projects. Implementation monitoring is achieved by selecting a representative number of treatment units each year from a sample pool of completed stands or project areas. Across the forest, 30 evaluations are made each year of stream protection zones (T01), skid trails (T02), landings (T04), roads and stream crossings (E08 and E09), road decommissioning (E10), and prescribed burns (F25). These results are summarized and reported annually. Effectiveness monitoring (see below) will be conducted at the same sites. When portions of the Union Hill Hazardous Fuels Reduction and Ecological Restoration Project are completed, they will be entered in the sample pool for the year of completion (or sometimes the following year, depending on the BMP to be evaluated), and may be chosen for evaluation.

Effectiveness Monitoring

The purpose of effectiveness monitoring is to evaluate whether the implementation of the project meet resource objectives. There are a few resource objectives for watershed and aquatics. The following question is project specific.

- Are Best Management Practices applied during project activities effective in meeting onsite objectives? The objective is 100 percent BMP effectiveness. Results for any BMP below 90 percent trigger a review of the activity area before implementation of further projects. Sites with poor effectiveness will be reviewed promptly for remediation.

- The sample pool selected for implementation monitoring will also be evaluated for BMP effectiveness. When portions of the Union Hill Hazardous Fuels Reduction and Ecological Restoration Project are completed, they will be entered in the sample pool for the year of completion (or sometimes the following year, depending on the BMP to be evaluated), and may be chosen for evaluation. The recent Region 5 amendment to the Forest Service Handbook for water quality management indicates Forests should strive to achieve BMP effectiveness rates of 90% to 95% (USDA Forest Service 2011).

Central Valley Regional Water Quality Control Board (CVRWQCB, Central Valley Board) Monitoring. On April 28, 2005, the Regional Board adopted the Conditional Waiver of Waste Discharge Requirements for Discharges Related to Timber Harvest Activities in Resolution R5-2005-0052 (California Regional Water Quality Control Board Central Valley Region 2005). Waiver specifies eligibility criteria and conditions that must be met by dischargers engaged in timber harvest activities on private and Forest Service lands in order to qualify for a waiver of waste discharge requirements. Dischargers submit Waiver Applications prior to commencement of timber harvest activities and Waiver Certifications at the conclusion of those activities. The resolution states "…the Regional Water Boards will wave issuance of waste discharge requirements for United States Forest Service (USFS) timber harvest activities that may result in non-point source discharges, provided that the USFS designs and implements its project to fully comply with State water quality standards." The Resolution includes Attachment A, Waiver of Waste Discharge Requirements for Discharges Related to Timber Harvest Activities and Attachment B, Monitoring and Reporting Conditions for Dischargers.

Attachment A states:

> "The State Water Board continues to certify and the US Environmental Protection Agency continues to approve, pursuant to Section 208 of the federal Clean Water Act, the plan entitled "Water Quality Management for National Forest System Lands in California" including the best management practices set forth therein, and the designation of the USFS as the management agency."
>
> "The USFS maintains (a) a water quality program consistent with the Basin Plan and consistent with the requirements of all other applicable water quality control plan; and (b) a program to monitor the implementation and effectiveness of best management practice."
>
> "The USFS shall comply with all conditions specified in Attachment B, "Monitoring Conditions." The USFS shall also comply with all applicable requirements of Implementation, Forensic and Effectiveness Monitoring and Reporting Program No. R5-2005-0052. The USFS shall comply with additional monitoring and reporting program requirements (including, but not limited to, water quality compliance and/or assessment and trend monitoring) for all projects (except forest stand improvement and hazard tree removal projects) when directed in writing by the Executive Officer. As specified in Attachment B, the USFS is required to conduct effectiveness and forensic monitoring only when: (1) the discharger's cumulative watershed effects analysis indicates that the project, combined with other USFS projects conducted in the watershed over the past 10 years, may cause any watershed or sub-watershed to

exceed a threshold of concern as determined by various models (i.e., Equivalent Roaded Acres (ERA), Surface Erosion (USLE), Mass Wasting (GEO), etc.). The USFS shall comply with the General Conditions described in Part I.B., above.

Attachment B defines monitoring and reporting conditions. Implementation monitoring is detailed visual monitoring of harvested areas and roads/landings prior to rainy season, with emphasis placed on determining if management measures (such as erosion control measures, riparian buffers were implemented or installed in accordance with approved Waivers. The Forest Service Region 5 Best Management Practices Evaluation Program (BMP EP) meets the intent of implementation monitoring. The BMPEP program requires each Forest to randomly sample ground disturbing activities every year.

Attachment B defines effectiveness monitoring, as monitoring subsequent to harvest to evaluate whether particular management measures were effective at achieving desired results. Effectiveness Monitoring may be applied at a range of spatial scales, focusing on specific management measures for multiple rainfall events or multiple years. Effectiveness Monitoring may include visual hillslope monitoring (observations outside of the stream or stream channel, i.e., on the harvested slopes) or visual in-stream monitoring (evaluation of in-stream conditions). Effectiveness monitoring inspection are conducted as soon as possible following the winter period to determine the effectiveness of management measures in controlling discharges of sediment and in protecting water quality. The effectiveness monitoring inspection occurs as follows:

- After March 15 and before June 15 to assess the effectiveness of management measures designed to address controllable sediment discharges and to determine if any new controllable sediment sources have developed.

- The Effectiveness monitoring inspection shall include visual inspection of hillslope components (roads, landings, skid trails, watercourse crossings and unstable areas) for significant management measure failure(s). A visual inspection of in-stream components (bank composition and apparent bank stability, water clarity and in-stream sediment deposition) shall also be conducted.

Attachment B defines forensic monitoring, as a visual field detection technique to detect significant pollution caused by failed management measures, failure to implement necessary measures, legacy timber activities, non-timber related land disturbances and natural sediment sources. Forensic Monitoring may also include photo-point monitoring to document pollution sources. Forensic Monitoring is most successful when criteria such as storm events of particular size are used to trigger field investigations for timely detection and repair of controllable sediment sources. Forensic monitoring inspections are conducted during the winter period, at least two times as follows:

- Once, during or within 12 hours following a 24-hour storm event of at least 2 inches (of rainfall) and after 5 inches (of total precipitation) has accumulated after November 15 and before April 1. If inspections cannot be conducted during or within 12 hours of such a storm event (due to worker safety, access or other uncontrollable factors) it would be conducted as soon as possible thereafter.

- Once, during or within 12 hours following a 24-hour storm event of at least 2 inches (of rainfall) and after 15 inches (of total precipitation) has accumulated after November 15 and before April 1. If inspections cannot be conducted during or within 12 hours of such a storm event (due to worker safety, access or other uncontrollable factors) shall be conducted as soon as possible thereafter.

Additional Forensic Monitoring inspections would be conducted if the following "observation trigger" occurs: A noticeable significant discharge of sediment is observed at any time in any Class I or Class II watercourse. Photo-point monitoring would be conducted when such discharge is the result of failed water quality protection management measure(s) or lack of implementation of such measure(s). Follow-up forensic monitoring inspections would continue until corrective action is completed to repair or replace failed management measures and/or significant sediment discharges have ceased.

Reporting Requirement. The Forest Service is required to submit an Annual Monitoring report to the Central Valley Board by July 15 for inspections covering the previous winter period for every year a timber harvest activity is enrolled in the Waiver. The timely submittal of a Forest Service BMP evaluation report will satisfy the reporting requirement for implementation monitoring for federal lands.

Wildlife Adaptive Management and Monitoring

Implementation monitoring will occur in proposed treatment units. Effectiveness monitoring will examine the ability of fire and resource managers to predict the outcome of fire-related effects and will enable land management agencies to more predictably apply prescribed natural fire as a tool to enhance owl habitat.

Monitoring will occur by (1) surveys to protocol the following year to confirm any single/pair detections and/or reproductive success – measure of success is rated by how habitat changes caused by the underburn affected owl productivity; (2) field reviews and photo points of the area to compare and evaluate light underburn – measure of success is through photo comparison; (3) drawing conclusions from the relationship between reproductive success and implementation of the treatment.

The monitoring frequency will be (1) visual monitoring at the time of treatment, (2) field surveys for owl presence the following year, (3) productivity and owl use over a three-year period.

Appendix A7: Past, Present, and Future Foreseeable Activities

Timber harvest activities presented in this appendix are activities that occurred within the CWE analysis area (Subwatershed 1-16) within the past 25 years both on NFS land and private. Activities planned in 2013 besides the proposed action (not presented in this appendix) is considered future foreseeable actions and anything prior is considered to be past activities. The past NFS timber activities were derived from the FACTS (Forest Service ACtivity Tracking System) database. A GIS shapefile of Timber Harvest Plans (THPs) were attained from the California Department of Forestry and Fire Protection (CALFIRE) for the past and future foreseeable private timber harvest activities. Canopy change detection imagery was used in the analysis to determine areas that had past timber activities that weren't covered by the FACTS database and the THP shapefile. The canopy change detection imagery and aerial photos help to determine the year, aerial extent, and general harvest activity.

The acres and timber harvest activities (prescriptions) reflected in this appendix is as accurate as possible because the missing data gaps were filled in by the canopy change detection imagery and aerial photos.

Table A7-1. Past Forest Service timber harvest activities.

Type of Activity and Year Implemented	Total Acres
1988	**241.97**
Broadcast Burning - Covers a majority of the unit	26.59
Plant Trees	26.59
Site preparation for natural regeneration	29.66
Site preparation for planting	36.37
Stand Clearcut (EA/RH/FH)	115.76
Tree Release and Weed	6.99
1989	**557.05**
Broadcast Burning - Covers a majority of the unit	32.14
Burning of Piled Material	143.26
Plant Trees	36.37
Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	22.22
Site Preparation for Planting - Mechanical	130.65
Stand Clearcut (EA/RH/FH)	143.50
Tree Release and Weed	48.91
1990	**616.92**
Broadcast Burning - Covers a majority of the unit	9.92
Burning of Piled Material	82.60
Plant Trees	183.63
Site Preparation for Planting – Mechanical	172.51
Stand Clearcut (EA/RH/FH)	40.71
Tree Release and Weed	127.56

Table A7-1. (continued).

Type of Activity and Year Implemented	Total Acres
1991	**501.95**
Burning of Piled Material	1.59
Fill-in or Replant Trees	28.03
Plant Trees	170.92
Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	24.17
Site Preparation for Planting - Mechanical	18.29
Stand Clearcut (EA/RH/FH)	159.87
Tree Release and Weed	99.08
1992	**619.04**
Commercial Thin	190.14
Fill-in or Replant Trees	8.95
Plant Trees	31.25
Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	14.11
Single-tree Selection Cut (UA/RH/FH)	3.00
Site preparation for planting	184.02
Site Preparation for Planting - Mechanical	25.54
Tree Release and Weed	162.04
1993	**116.22**
Plant Trees	24.17
Precommercial Thin	31.20
Tree Release and Weed	60.86
1994	**404.29**
Plant Trees	189.56
Site Preparation for Planting - Burning	22.42
Tree Release and Weed	192.31
1995	**313.61**
Fill-in or Replant Trees	155.79
Site Preparation for Planting - Mechanical	16.71
Tree Release and Weed	141.11
1996	**89.75**
Plant Trees	16.71
Tree Release and Weed	73.05
1997	**221.83**
Area release and weeding	205.12
Tree Release and Weed	16.71
1998	**251.00**
Area release and weeding	157.60
Commercial Thin	50.71
Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	6.56
Site preparation for planting	36.13

Table A7-1. (continued).

Type of Activity and Year Implemented	Total Acres
1999	**127.91**
Area release and weeding	14.63
Plant Trees	83.35
Site preparation for planting	29.93
2000	**153.48**
Area release and weeding	40.20
Fill-in or Replant Trees	12.08
Plant Trees	17.85
Tree Release and Weed	83.35
2001	**17.85**
Tree Release and Weed	17.85
2002	**35.52**
Site Preparation for Planting - Burning	23.44
Tree Release and Weed	12.08
2003	**641.01**
Area release and weeding	22.42
Commercial Thin	135.38
Fill-in or Replant Trees	23.44
Other control of understory vegetation	99.89
Precommercial Thin	247.51
Rearrangement of Fuels	96.47
Tree Release and Weed	15.90
2004	**384.19**
Area release and weeding	89.04
Burning of Piled Material	122.96
Commercial Thin	1.30
Site Preparation for Planting - Mechanical	59.32
Underburn - Low Intensity (Majority of Unit)	111.56
2005	**152.27**
Area release and weeding	29.66
Burning of Piled Material	63.29
Fill-in or Replant Trees	29.66
Site Preparation for Planting - Mechanical	29.66
2006	**347.56**
Commercial Thin	13.31
Sanitation (salvage)	334.26
2007	**547.32**
Burning of Piled Material	334.26
Commercial Thin	125.38
Disease Control	1.96
Group Selection Cut (UA/RH/FH)	35.83
Special Cut	49.90

Table A7-1. (continued).

Type of Activity and Year Implemented	Total Acres
2008	**165.56**
Mastication/Mowing	66.89
Removal cut	3.04
Sanitation (salvage)	45.23
Sanitation Cut	14.57
Site preparation for planting	35.83
2009	**1039.54**
Burning of Piled Material	66.89
Piling of Fuels, Hand or Machine	236.08
Plant Trees	35.83
Precommercial Thin	73.20
Rearrangement of Fuels	406.73
Sanitation Cut	3.43
Thinning for Hazardous Fuels Reduction	217.38
2010	**601.83**
Burning of Piled Material	48.37
Jackpot Burning - Scattered concentrations	121.62
Piling of Fuels, Hand or Machine	154.21
Thinning for Hazardous Fuels Reduction	277.63
2011	**190.04**
Area release and weeding	35.83
Burning of Piled Material	154.21
Grand Total	8337.73

Table A7-2. Past private timber harvest activities.

Type of Activity and Year Implemented	Total Acres
1998	**18.51**
Clearcut	6.40
Shelterwood Removal Cut	12.11
2000	139.72
Shelterwood Removal Cut	106.17
Selection Cut	33.54
2001	**190.25**
Sanitation Salvage	150.37
Shelterwood Removal Cut	5.91
Selection Cut	33.97
2002	**197.91**
Shelterwood Removal Cut	113.21
Selection Cut	84.70
2003	**377.18**
Shelterwood Removal Cut	143.89
Group Selection	233.30
2004	**390.41**
Clearcut	16.64
Commercial Thin	46.57
Group Selection	242.72
Shelterwood Removal Cut	75.41
Selection Cut	9.06
2005	**112.10**
Group Selection	81.22
Shelterwood Removal Cut	30.87
2006	**343.45**
Shelterwood Removal Cut	14.44
Group Selection	329.02
2007	**343.99**
Sanitation Salvage	1.04
Shelterwood Removal Cut	73.65
Clearcut	40.97
Group Selection	224.40
Rehabilitation	3.92
2008	**498.58**
Sanitation Salvage	3.89
Clearcut	43.28
Group Selection	433.06
Rehabilitation	18.35
Grand Total	2612.09

Table A7-3. Timber harvest activities derived from aerial photo interpretation.

	Ownership (Acres)		
Type of Activity and Year Implemented	FS	Private	Total Acres
1988	0.00	5.02	5.02
Clearcut	0.00	5.02	5.02
1990	0.00	93.43	93.43
Clearcut	0.00	22.88	22.88
Commercial Thin	0.00	70.55	70.55
1991	27.01	45.80	72.82
Clearcut	5.37	25.32	30.68
Commercial Thin	21.65	20.49	42.13
1992	110.23	0.00	110.23
Clearcut	10.88	0.00	10.88
Commercial Thin	99.35	0.00	99.35
1993	0.00	9.82	9.82
Commercial Thin	0.00	9.82	9.82
1994	9.33	32.01	41.34
Area Release and Weeding	9.33	0.00	9.33
Commercial Thin	0.00	32.01	32.01
1995	0.00	13.80	13.80
Clearcut	0.00	13.80	13.80
1996	0.00	39.48	39.48
Clearcut	0.00	39.48	39.48
1997	0.00	68.17	68.17
Commercial Thin	0.00	68.17	68.17
1998	50.50	0.00	50.50
Area Release and Weeding	23.61	0.00	23.61
Commercial Thin	26.89	0.00	26.89
1999	46.34	0.00	46.34
Area Release and Weeding	46.34	0.00	46.34
2000	18.30	142.49	160.78
Area Release and Weeding	10.64	0.00	10.64
Clearcut	0.00	2.63	2.63
Commercial Thin	0.00	139.86	139.86
Mastication	7.66	0.00	7.66
2001	0.00	369.70	369.70
Commercial Thin	0.00	369.70	369.70
2005	0.00	27.86	27.86
Commercial Thin	0.00	27.86	27.86
2006	27.12	0.00	27.12

Table A7-3. (continued).

Type of Activity and Year Implemented	Ownership (Acres) FS	Private	Total Acres
Mastication	13.37	0.00	13.37
Precommercial Thin	13.75	0.00	13.75
2007	0.00	24.20	24.20
Commercial Thin	0.00	11.07	11.07
Precommercial Thin	0.00	13.13	13.13
Grand Total	288.83	871.77	1160.59

Table A7-4. Future foreseeable Forest Service timber harvest activities.

Type of Activity and Projected Year of Implementation	Grass Flat	Silvertip	Bald Mountain	Total Acres
2013	1212.63	18.59	0.00	1231.22
Group Selection	25.93	0.00	0.00	25.93
Hand Cut/Grapple Pile	488.66	0.00	0.00	488.66
Hand Cut/Pile Burn	214.33	0.00	0.00	214.33
Mastication	237.25	0.00	0.00	237.25
Mechanical Thinning	130.03	0.00	0.00	130.03
No Treatment	4.97	0.00	0.00	4.97
Roadside Hazard Tree Removal	0.00	18.59	0.00	18.59
Sanitation Salvage	70.64	0.00	0.00	70.64
Underburn	40.82	0.00	0.00	40.82
2015	0.00	0.00	35.83	35.83
Area release and weeding	0.00	0.00	35.83	35.83
Grand Total	**1212.63**	**18.59**	**35.83**	**1267.05**

Table A7-5. Future foreseeable private timber harvest activities.

Type of Activity and Projected Year of Implementation	Total Acres
2013	766.12
Shelterwood Removal Cut	245.81
Clearcut	12.05
Group Selection	508.26

Appendix A-8:
National Forest Management Act Findings

V. FINDINGS REQUIRED BY OTHER LAWS AND REGULATIONS

Based on the analysis and prescriptions for stands in the Sugarloaf Project area, the following finding of facts pursuant to the *National Forest Management Act* (NFMA) (16 USC 1604), are as follows:

A. The minimum specific management requirements to be met in carrying out projects and activities for the National Forest System are set forth in this section. Under 16 U.S.C. 1604 (g)(3)(E) a Responsible Official may authorize project and activity decisions on NFS lands to harvest timber only where:

1. Soil, slope, or other watershed conditions will not be irreversibly damaged.

The Plumas National Forest Land and Resource Management Plan (LRMP) Forest-wide Standards and Guidelines as amended by the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (SNFPA FS EIS ROD) relating to soil cover, water quality, and riparian system protection guidelines and Best Management Practices (BMPs) would be implemented to protect and mitigate potential impacts to soil and water quality.

The District Hydrologist has determined through a Cumulative Watershed Effects (CWE) Analysis that no irreversible or irretrievable commitments of soils, riparian, or water resources are expected for any alternative (see Hydrology and Soils Reports).

2. There is assurance that such lands can be adequately restocked within five years after harvest.

All trees proposed for removal under the Sugarloaf Project including variable density and area thinning from below under Alternatives C and D and Group Selections harvest under Alternative B, are considered uneven age methods. However, the areas proposed for Group Selection can be regenerated using standard reforestation techniques.

3. Protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat.

The Plumas National Forest Land and Resource Management Plan Forest-wide Standards and Guidelines as amended by the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (SNFPA FS EIS ROD) relating to soil cover, water quality, and riparian system protection guidelines and Best Management Practices (BMPs) would be implemented to protect and mitigate potential impacts to soil and water quality.

4. The harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber.

The purpose of harvesting trees is to achieve hazardous fuels reduction and lower forest crown densities as a step toward establishing desired healthy ecosystem conditions, resilient to disturbances. Harvest and treatment methods are planned to minimize resource effects, while allowing for safe,

feasible logging operations within the threshold limits imposed by SNFPA FS EIS ROD. In those areas where trees are removed for commercial purposes, the primary silvicultural method are variable density and area intermediate harvests utilizing ground-based equipment.

It is likely there would be an economic timber sale with this proposal, but there may also be a service contracts with an embedded timber sale. Wood products would be removed from the area for use in local mills or energy plants to contribute to economic stability.

The 2004 SNFPA FS EIS ROD standards and guidelines for resource protection increase operational costs to reduce the potential optimum potential economical return by constraining canopy reductions and spatial distribution lowering timber volume outputs. The various treatment methods and systems were prescribed to provide a viable method of meeting a wide variety of resource management objectives without optimizing one resource at the expense of another.

B. A Responsible Official may authorize project and activity decisions on National Forest System lands using clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber as a cutting method only where:

Even-aged management would not be applied to the stands at this time.

1. For clearcutting, it is determined to be the optimum method, and for other such cuts it is determined to be appropriate, to meet the objectives and requirements of the relevant land management plan (16 U.S.C. 1604 (g)(3)(F)(i));

Group Selection harvests (0.5 – 2.0 acres) proposed under Alternative B are an uneven age management method and would require a minor amendment to the 1988 Plumas LRMP as amended by the SNFPA FS EIS ROD as part of the decision.

2. The interdisciplinary review as determined by the Secretary has been completed and the potential environmental, biological, esthetic, engineering, and economic impacts on each advertised sale area have been assessed, as well as the consistency of the sale with the multiple use of the general area (16 U.S.C. 1604 (g)(3)(F)(ii));

The ID team used a systematic, interdisciplinary approach to analyze the affected area and estimate the environmental effects. The analysis included input through public involvement. The ID analysis was based on LRMP direction, as amended by SNFPA FS EIS ROD of 2004.

3. Cut blocks, patches, or strips are shaped and blended to the extent practicable with the natural terrain (16 U.S.C. 1604 (g)(3)(F)(iii));

Even-aged management would not be applied to the stands at this time. However, Group Selection areas are dispersed, and the shapes are, indeed, naturally appearing.

4. There are established according to geographic areas, forest types, or other suitable classifications the maximum size limits for areas to be cut in one harvest operation, including provision to exceed the established limits after appropriate public notice and review by the responsible Forest Service officer one level above the Forest Service officer who normally would approve the harvest proposal; provided, that such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm (16 U.S.C. 1604 (g)(3)(F)(iv)); and

The Sugarloaf Project is designed to fulfill the management direction specified in the Plumas National Forest Land and Resource Management Plan, as amended by the SNFPA FS EIS ROD (January 21, 2004).

5. Such cuts are carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources, and the regeneration of the timber resource (16 U.S.C. 1604 (g)(3)(F)(v)).

No harvest cuts are designed to regenerate even-aged stands. However, soil, watershed, fish and wildlife, recreation, and aesthetic resources would be protected. Also, as stated above all areas can be regenerated using standard methods.

6. Under 16 U.S.C. 1604 (m) even-aged stands of trees scheduled for regeneration harvest generally have reached culmination of mean annual increment of growth, unless the purpose of the timber cutting is excepted in the land management plan (FSM 1921.17f).

Even-aged management would not be applied to the stands at this time. Group Selection harvests (0.5–2.0 acres) proposed under alternative B are an uneven age management method.

Appendix A9:
Response to Scoping Issues and DEIS Comments

A9-1. Response to Comments submitted during the Scoping Period

The following information displays Forest Service responses to public comments on the Sugarloaf Hazardous Fuels Reduction Project (Sugarloaf Project) submitted during the Scoping Period beginning June 5, 2012; classified as non-significant

Non- Significant Issues were defined by the IDT as those: (1) outside the scope of the proposed action; (2) already decided by law, regulation, Forest Plan, or other higher level decision; (3) irrelevant to the decision to be made; (4) conjectural and not supported by scientific or factual evidence; or (5) the comment could not be phrased as a cause-effect relationship. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review… (Sec. 1506.3)."

This section includes (1) a table listing the name and location of the commenter, the organization or entity each commenter represents, and the date of the comment, and (2) a narrative of the Forest Service's responses to the comments provided.

Table A9-1. Commenters during the scoping period.

Commenter	Entity	Location	Date of Comment	Comment
Chad Hanson, Director (JMP)	John Muir Project (JMP)	Cedar Ridge, CA (JMP)	June 27, 2012 Field Trip to Sugarloaf Project area	Provided recommendations to allow for snag creation using high intensity prescribed fire. FS policy does not allow for high intensity fire, however allowance for moderate intensity prescribed fire and designated snag retention areas were incorporated into alternative D.
Ken Wilde John Forno	Sierra Pacific Industries (SPI)	Lincoln, CA	June 18, 2012	Provided recommendations concerning logging operations and biomass already incorporated under alternative D.
Frank Stewart	Lassen, Plumas, Shasta, Sierra and Tehama Counties "QLG" Forester	Chico, CA	August 8, 2012	Provided general comments regarding Plumas National Forest accomplishments under HFQLG Act and clarification questions regarding treatment methods.
CR Brookshire	Claimant	Garden Valley, CA	June 19, 2012	Provided information about location of mining claim.

A9-2. Response to Comments on the DEIS

The following information displays Forest Service responses to public comments on the Sugarloaf Hazardous Fuels Reduction Project (Sugarloaf Project) Draft Environmental Impact Statement (DEIS) released in July 2013. This document includes (1) a table listing the name and location of the commenter, the organization or entity each commenter represents, and the date of the comment, and (2) a narrative of comment statements and Forest Service responses organized by resource as presented in chapter 3. The comment statement is taken from the comment letters compiled in the project record. A complete copy of each letter is available for public review upon request.

Summary of Comments Received

The Responsible Official received written comments from four organizations and one landowner. The Council on Environmental Quality (CEQ) regulation 40 CFR 1503.4 states that an agency preparing a final environmental impact statement shall assess and consider comments both individually and collectively, and shall respond by one or more of the means listed below, stating its response in the final statement. Possible responses are to:

1. Modify alternatives including the proposed action,
2. Develop and evaluate alternatives not previously given serious consideration by the agency,
3. Supplement, improve, or modify its analyses,
4. Make factual corrections,
5. Explain why comments do not warrant further agency response.

Table A9-2. Commenters on the Sugarloaf Hazardous Fuels Reduction Project (Sugarloaf Project) Draft Environmental Impact Statement (DEIS).

Comment ID Code	Commenter	Entity	Location	Date of Comment
JMP and CBD	Chad Hanson, Director (JMP) Justine Augustine, Attorney (CBD)	John Muir Project (JMP) Center for Biological Diversity (CBD)	Cedar Ridge, CA (JMP)	September 5, 2013
SPI	Ken Wilde	Sierra Pacific Industries (SPI)	Lincoln, CA	September 7, 2013
EPA	Kathleen Martyn Goforth, Manager	Environmental Protection Agency (EPA), Region 9, Environmental Review Office, Communities and Ecosystem Division	San Francisco, CA	September 9, 2013
OEPC	Patricia Sanderson Port, Environmental Officer	USDI, Office of Environmental Policy and Compliance (OEPC), PSW Region	San Francisco, CA	September 5, 2013

Comments and responses on the Sugarloaf Hazardous Fuels Reduction Project are sorted by comment number in order of appearance in chapter 3 of the FEIS (FF) – Fire and Fuels; (FV) – Forest Vegetation; (WL) – Wildlife; and (ESE) – Economic and Social Environment.

Fire and Fuels (FF)

Comment #1: The DEIS concluded that, due to fuel accumulation from fire suppression, and resulting Condition Class 2 and 3 areas dominating the landscape, "fires that affect significant portions of the landscape, which once varied considerably in severity, are now almost exclusively high-severity, large, stand-replacing fires." However, the EIS did not offer any data source to support this statement (John Muir) (Chad Hanson, JMP, pp. 1)

Response #1: This comment is not specific to the Sugarloaf project and is beyond the scope of the project. Furthermore the purpose of the Sugarloaf project is not to change Fire Regime Condition Class, but to reduce the hazardous fuels accumulations in the project area, see chapter 1, section 1.4 of the Sugarloaf FEIS for the purpose and need of the project.

The Sugarloaf analysis refers to Fire Regime Condition Class as a way to describe the affected environment pp. 3–9 to 3–10, but not as a purpose of the project.

The 2004 Framework EIS provide standards and guidelines for National Forests in the Sierra Nevada to follow when designing projects. The Framework states on p. 35 of the ROD, "Site-specific fuels treatment prescriptions are designed to modify fire intensity and spread in treated areas. Managers consider topographic position; slope steepness; predominant wind direction; and the amount and arrangement of surface, ladder, and crown fuels in developing fuels treatment prescription for each treatment area. Fuels treatments are intended to reduce surface, ladder, and crown fuels. Crown fuels are modified to reduce the potential for spread of crown fire."

The Sugarloaf project was designed and analyzed using site specific project data. See the Sugarloaf FEIS, Chapter 3, Fire and Fuels section for Analysis Methodology section 3.1.2 that explains what information was gathered to analyze the Sugarloaf project.

The 2004 SNFPA decision has not been vacated by the courts and the decision, with its standards and guidelines, remains in effect. The Sugarloaf project is in compliance with the 2004 Framework decision and its standards and guidelines.

Comment #2: With regard to the effects of wildland fire in Condition Class 2 and 3 areas, the 2004 Framework EIS made the following conclusion: "Condition Classes 2 and 3 are the targets for treatment. Condition Class 2 is composed of lands where fire regimes have been altered from their historic ranges, creating a moderate risk of losing key ecosystem components as a result of wildfire. The vegetative composition, structure, and diversity of lands in Condition Class 3 have been significantly altered due to multiple missing fire return intervals. These lands 'verge on the greatest *risk of ecological collapse*.'"

2004 Framework EIS, p. 126 (emphasis added). The EIS did not cite to any scientific source to support this statement. The EIS (p. 126) stated that approximately 4 million acres of forest were in Condition Class 2, and about 3 million acres were in Condition Class 3 (Chad Hanson, JMP, pp. 1).

Response #2: The 2004 SNFPA decision has not been vacated by the courts and the decision, with its standards and guidelines, remains in effect. Therefore, the Sugarloaf Project was designed to be in compliance with the 2004 Framework decision and its standards and guidelines.

Beginning in 1982, the USDA Forest Service advanced the fire danger rating system comprised of 13 fire behavior fuel models (Anderson 1982) to 40 fire behavior fuel models (FM) (Scott and Burgan 2005); now a predictive tool commonly used in project planning. The use of FMs by the IDT during alternative development provided a method to predict likely fire behavior outcomes correlating to mapped California Wildlife Habitat Relationship (CWHR) types, to help determine where sensitive watersheds, botanical and rare habitats are most vulnerable to crown fire effects (FEIS section 2.1.3). This correlation between fuel models and CWHR types underlies the combination, placement and intensity of proposed ecologically appropriate treatments introduced in FEIS section 2.1.4: Representative Ecological (CWHR) Types.

See the Fire and Fuels section in Chapter 3 of the Sugarloaf FEIS for descriptions of Fire Regime Condition Classes (FRCC) used in the Sugarloaf analysis area. The Fire Regime Condition classes were used as a way to describe the affected environment. The FRCC system acknowledges the natural role of stand replacing fires on the landscape; three of the five Fire Regime groups are represented by characteristically stand replacing fire events, and the remaining two include mixed severity fires as characteristic events (Interagency Fire Regime Condition Class Guidebook, 2010). This model does not provide a robust measure of biodiversity; rather, it is meant to provide a simplified, easy to understand measure of ecological trends for a given landscape.

Comment #3: The 2004 Framework FEIS (p. 125) assumed that fire severity/intensity is increasing in Sierra Nevada forests (Chad Hanson, JMP, pp. 1).

Response #3: The Fire and Fuels section of Chapter 3 in the FEIS cites numerous peer reviewed articles that discuss trends in fire severity in the Sierra Nevada indicating the fire severity/intensity is increasing in Sierra Nevada forests. As with much scientific opinion there are often conflicting expert viewpoints and findings tend to be generalized; in this case, to a bioregional scale. Although the commenters submitted Hanson's and Odion's article was reviewed and evaluated, the Fire and Fuels analysis performed using the best available science along with local knowledge of fire behavior influenced by prevailing winds and topographic features with the Sugarloaf project area, indicates the assumption fire intensity/severity will be high are valid for the purposes of the FEIS analysis.

Comment #4: See the Fire and Fuels section 3.2.4 in Chapter 3 of the FEIS for description of burn severity in two fires that burned on the Plumas National Forest in similar vegetation types as the Sugarloaf project. Approximately 97 percent of the Sugarloaf analysis area is classified by Fire Regime 1 characterized by frequent primarily low to mixed severity fires and 3 percent of the area in Fire Regime II, characterized by less frequent stand replacing fire. The amount of high severity burn experienced in the Moonlight and Antelope Complex are beyond the desired condition of the Sugarloaf project.

Response #4: The 2004 Framework assumed that home protection is best accomplished by a ¼-mile wide "Defense Zone" surrounding towns, and groups of cabins, as well as an additional 1.5-mile wide "Threat Zone" surrounding the Defense Zone (Chad Hanson, JMP, pp. 1).

The 2004 Framework ROD page 40 gives general buffer distances for the defense and threat zones but, also suggest that defense and threat boundaries be set at the project level by fire management specialist. The Plumas National Forest worked with Plumas County Fire Safe Council and numerous other partners in the development of the Plumas County

Community Wildfire Protection Plan (CWPP) to establish defense and threat boundaries that took into account watersheds, values at risk, topography, natural barriers and strategic suppression features such as ridges and roads. This CWPP was a collaborative effort by the Plumas County Fire Safe Council, County of Plumas, City of Portola, Plumas County Fire Chiefs Association, California Department of Forestry and Fire Protection, Plumas National Forest, and community members. Participation was also invited at each monthly PC FSC meeting during the planning process. PC FSC members met with County Board of Supervisors & Fire Chiefs on a number of occasions to keep them informed.

At the project level the Interdisciplinary Team (IDT) took into account site specific details such as; fire history, weather, topography, values at risk and fuel loading (see FEIS Chapter 3 Fire and Fuels, Affected Environment) to determine if the defense and threat zones needed to be re-defined. We made no changes at the project level from the Plumas County layer that was established in 2010. The Sugarloaf project is in compliance with the 2004 Framework decision and its standards and guidelines.

Forest Vegetation (FV)

Comment #5: The Environmental Protection Agency (EPA) recognizes the critical role of fuels management in the health of our nation's forest. We commend the Forest Service for its focus on ecological restoration. Based on our review of the DEIS, we have rated the Preferred Alternative as Lack of Objections (Kathleen Martyn Goforth, EPA, pp. 1).

Response #5: Thank you for your commendation and subsequent rating.

Comment #6: The DEIS discusses, in three locations (pages 3-32, p.3-47 and 3-211), the expected changes likely to result in climate change. We encourage the Forest Service to include, in the FEIS, a more systematic and comprehensive discussion of the impacts of climate change on the project, and measures to improve the project's adaptability to climate change. For example, we recommend adding a discussion of the increased vulnerability of specific species under a reasonable anticipated climate change scenario, and an explanation of the projected shift of forest species to more suitable range elevations. The FEIS should also discuss measures to improve forest adaptability to climate change, such as the selection of certain species for replanting (Kathleen Martyn Goforth, EPA, pp. 1).

Response #6: The Sugarloaf Forest Vegetation Report includes a comprehensive discussion about stand density concepts, forest structure and composition reference conditions, existing forest health conditions, likely trends in climate change, uncertainty in climate change, and desired conditions of forest stand structure and species composition. Brief excerpts are included below.

The majority of scientific research concerning climate trends indicates that climate has been changing since the mid-twentieth century. This may be likely due to the increase in human activities which emit greenhouse gases such as the combustion of fossil fuels. Trends suggest that the northern Sierra Nevada may become generally warmer and wetter, with longer periods of prolonged summer drought. While warmer and wetter weather patterns may increase forest growth and carbon sequestration, warmer temperatures in combination with longer periods of prolonged summer drought will likely increase forest insect and disease outbreaks and the occurrence of high severity fire – disturbances which may result in increased carbon losses. Such high severity disturbances could result in type-conversion to shrub lands in forested ecosystems that are not adapted to such disturbance patterns – which could drastically alter carbon cycles in the short and long term.

Fellows and Goulden (2008) found that the combination of fire suppression and past timber management practices has resulted in an increase in stem density of small trees in western mid-montane conifer forests while aboveground carbon stocks decreased due to the net loss of large trees. These dense stands are particularly vulnerable to disturbances and mortality during drought periods (Kolb et al. 1998, Smith et al. 2005 in Fellows and Goulden 2008).

Lutz et al. (2009) observed a decrease in large diameter trees, particularly in forests where fire was excluded and stand densities were high, and the authors view increased water stress –either from climate change or increased stand densities- and suggest this trend may continue to increase with warming climate trends. McDowell et al (2003) showed that reductions in stand density have a favorable growth effect on old-growth ponderosa pine which may reduce their susceptibility to drought induced mortality.

Battles et al. (2008) evaluated the impacts of climate change on the mixed-conifer region in California and provide insight to forest health concerns and management implications for forest managers. This study found that changes in climate could "exacerbate forest health concerns" by increasing weakened tree susceptibility to mortality as a result of fire, disease epidemics and insect outbreaks and potentially enabling forest insects and disease to expand ranges or increase potential for widespread damage. The authors suggest that forest management strategies that increase species diversity, promote heterogeneity, and create lower density stands would be effective in providing "structures that are more resilient to catastrophic events like fire and epidemics" (Battles et al. 2008)

At the project level, predicting how much and how fast temperatures may increase, how much and how fast precipitation trends may change, and what quantifiable effect these changes will have on forest vegetation in the project area remain uncertain. While it is acknowledged that broad trends in climate change may be generally described, the effects of specific alternatives on climate change and the effects of climate change on forest vegetation within the project specific location may be highly variable, have unknown levels of uncertainty and margins of error, and are largely unpredictable within the temporal and spatial bounds of this analysis

Millar et al. (2007) indicates that treatments which physically remove densities of small trees for energy generation (biomass fuels) or long-term sequestration (sawlogs) may minimize net carbon release. Consequently, this suggests that those alternatives that include more mechanical treatment in combination with prescribed fire rather than relying on prescribed fire only to reduce stand density may be more beneficial in managing emissions and carbon sequestration.

Fuel reduction and forest health treatments under the action alternatives are designed to maintain forested conditions and enhance forest resilience to disturbances such as wildfire, insect outbreaks, disease occurrences as well as climate induced drought which result in positive long term effects on the carbon cycle of these forests. Treatments which create low densities of healthy, vigorous, codominant and dominant residual trees are effective in lowering stand susceptibility to drought, competition-induced moisture stress, wildfire, and occurrences of forest insects and pathogens. Given that the analysis area is dominated by mid-seral closed-canopy stands, treatments which create low density open canopy stands would contribute to landscape heterogeneity and improve growth and development of later seral stands.

Reforestation treatments would use native seed source, from appropriate elevations with the anticipated effects of climate change on forests in mind. The species mix to be planted would include ponderosa and Jeffrey pine, Douglas-fir, rust-resistant sugar pine, and incense cedar – all drought tolerant and fire adapted species. Elevation guidelines for seedling location would prevent seedlings from being planted more than 500 ft lower in elevation from the parent tree, but would allow seedlings to be planted up to 1000 ft higher in elevation from the parent tree. This would address elevational rises of forest communities/ecotones as a result of changing climate trends.

Wildlife (WL)

Comment #7

Spotted Owl Population Trend - The 2004 Framework FEIS (pp. 141-142) stated that, using the most current methods, at that time, of determining California spotted owl population trend, the data indicate "a stable population" for all of the Sierra Nevada spotted owl study areas. Gutierrez et al. (2012), at page 14, found that spotted owls likely have a downward trend on the Eldorado Study Area, which previously reported a likely increasing trend based upon data that was later discovered to be faulty (Chad Hanson, JMP, pp. 1).

New Scientific Information:

"The random-effects means model suggested that the average λ over the study period for the modified data set may have been < 1.0, the value for a stable population (λt = 0.984, 95% C.I. = 0.955 to 1.013). For comparison, the average λ for the unmodified data set was λt = 0.989 (95% C.I. = 0.956 to 1.021). Annual population rate of change exhibited relatively low temporal variability (= 0.002, 95% C.I. = 0.000 to 0.018). Estimates of realized population change (which show the proportion of the initial population size remaining each year) suggested a decline in owl abundance (Δ = 0.81, 95% C.I. = 0.54 to 1.22; Figure 6), similar to the decline in the number of occupied territories (Fig. 5). Even the unmodified data set suggested a decline in owl abundance (Δ = 0.89, 95% C.I. = 0.58 to 1.36; Figure A3). [W]e found considerable support for a negative, log-linear trend in fecundity and productivity over the course of our study (Table 6)."

Further, the Forest Service's Plumas Lassen Administrative Study Report from the Lassen region found the following: "The estimated mean lambda for the Lassen Demographic Study between 1990-2010 was 0.979 (SE = 0.0097), with 95% confidence limits ranging from 0.959-0.999 (Scherer et al. 2010)…These results suggest a decline in the CSO population within the Lassen study area over the 20-year study period" (Keane et al. 2011, p. 119-120).

Moreover, Munton et al. (2012), on page 6, found that the Sierra National Forest Study Area now appears to be declining as well: "The estimated realized population change from 1992 to 2010 for SIE was below 1.0 (Δt = 0.85), but the 95% CI included 1.0, indicating no strong evidence of population decline (Figure 5). However, the last four estimates of Δt were among the lowest of the study period." Munton et al. (2012) found that the Sequoia-Kings Canyon Study Area, which is entirely on protected national park lands (where logging does not occur), likely has a stable, or possibly increasing, population.

In addition, Conner et al. (2013) found that two California spotted owl study areas that have experienced substantial mechanical thinning have seen declines in owl populations (11-21%), while the one study area in protected forest (no logging) has seen a 22% increase.

Thus, the only spotted owl study area in the Sierra Nevada with an apparently stable or increasing population is the one on protected forests with no logging, and all three of the study areas on national forest lands, which have been subjected to considerable mechanical thinning and post-fire salvage logging, either have declining trends or appear to have declining trends, according to the Forest Service's own science.

Response #7: The commenter suggests specific studies were either ignored or misrepresented in the analysis regarding the effects of logging on California spotted owls. Current scientific relative to the analyses of project effects on California spotted owls was incorporate in a discussion in the Wildlife BE /BA (Sugarloaf BE/BA pgs. 40–41)). Four demographic studies of California Spotted Owl have been ongoing for a number of years within the Sierra Nevada: (1) Eldorado National Forest (since 1986); (2) Lassen National Forest (since 1990); (3) Sierra National Forest (since 1990); and (4) Sequoia-Kings Canyon National Park (since 1990). Portions of the PNF (including the analysis area) are surveyed as part of the Lassen National Forest demographic study site. One of the primary objectives of these demographic studies is to monitor rate of change (lambda, λ) in owl populations (i.e., the number of owls present in a given year divided by the number of owls present the year before). For these demographic models a lambda (λ) value of 1 indicates a stable population; less than one indicates the population is decreasing, and greater than 1 indicates an increasing population. For the California spotted owl demographic studies, lambda is estimated individually for each study area at five-year intervals (Franklin et al. 2004, Blakesley et al. 2010). The most recent analysis, using data collected between 1990 and 2005, provided estimates of lambda for all four Sierra Nevada demography study areas (Blakesley et al. 2010):

- Lassen: $\lambda = 0.973$ (95% confidence interval, 0.946-1.001);
- Eldorado: $\lambda = 1.007$ (95% confidence interval, 0.952-1.066);
- Sierra: $\lambda = 0.992$ (95% confidence interval, 0.966-1.018);
- Sequoia-Kings Canyon: $\lambda = 1.006$, (95% confidence interval, 0.947-1.068).

Although researchers update demographic estimates for individual study sites annually in unpublished reports (e.g., Munton et al. 2012, Gutierrez et al. 2012, Keane et al. 2011,all referenced by the commenter), the most recent meta-analysis of data from all four study sites in the Sierra Nevada (Blakesley et al. 2010) provide the most robust demographic estimates available. With the exception of the Lassen study area, owl populations were stable, with adult survival rate highest at the Sequoia-Kings Canyon study site. The 95% confidence limit for lambda in the Lassen study area ranged from 0.946 to 1.001 (estimated value 0.973), which barely includes 1, and the analysis estimated a steady annual decline of 2–3% in the Lassen study population between 1990 and 2005.

The Sierra Nevada Adaptive Management Project conducted a new analysis in 2011 for the Eldorado demographic study area. However, results from this analysis are preliminary and may be subjected to corrections and revisions as they undergo the peer review process. Gutierrez, one of the study authors, cautions that results have not been peer reviewed and, therefore, until a published analysis is issued, the previous meta-analysis (Blakesley et al. 2010) remains valid (Gutierrez, personal communication, 2012). Further, recent evaluation (Conner et al. 2013, referenced by the commenter) of different estimation methods of the annual rate of population change and a comparison of the utility of using this metric and realized population change (ratio of population size at an end time period relative to the initial population size) to summarize population change over time produced similar results to the previous meta-analysis (Blakesley et al. 2010). References provided by commenters, among others, were reviewed and incorporated during project planning where appropriate.

A collection of, most, of the scientific literature consulted during the planning process was deposited in the Sugarloaf Project File (available at the Feather River Ranger District).

Comment #8: Spotted Owl PACs "Lost" Due to High-Intensity Fire -2004 Framework Assumptions/Conclusions: The 2004 Framework FEIS (p. 143-144) claimed that 4.5 California spotted owl Protected Activity Centers (PACs) were "lost" to higher-intensity fire since 1999 (providing a list of the 18 PACs), and claimed that an average of 4.5 PACs were being "lost" to fire each year. The 2004 Framework Record of Decision (ROD), on page 6, echoed this claim about losses of spotted owls to fire, and concluded that increased logging intensity was necessary in order to combat the threat of fire: "[G]iven that valuable [spotted owl] habitat is at high risk of being lost to wildfire, I cannot conclude that maintaining higher levels of canopy closure and stand density everywhere is the right thing to do."

New Scientific Information:

On August 1, 2004, the Associated Press published two investigative news stories on this claim of "lost" PACs, and found that: a) these PACs were generally still occupied by spotted owls; and b) the lead U.S. Forest Service wildlife biologist had been countermanded when he informed the Forest Service that the assertions about owl PACs being lost to fire were inaccurate (see attached news stories). Further, in 2009, scientists discovered, in a radio telemetry study, that, while California spotted owls choose unburned or low/moderate-severity fire areas for nesting and roosting, the owls preferentially select high-severity fire areas (that have not been salvage logged) for foraging (Bond et al. 2009). Roberts (2008) found that spotted owl reproduction rates were 60% higher in mixed-severity fire areas (not salvage logged) than in unburned forest. Moreover, Lee et al. (2012) found that mixed-severity wildland fire (with an average of 32% high-severity fire effects) does not reduce California spotted owl occupancy in Sierra Nevada forests (indeed, a number of the PACs that the 2004 Framework FEIS claimed to be "lost" remain occupied), but post-fire logging appears to reduce spotted owl occupancy considerably. Moreover, new science concludes that logging within the home range of spotted owls reduces occupancy.

Bond, M. L., D. E. Lee, R. B. Siegel, & J. P. Ward, Jr. 2009a. Habitat use and selection by California Spotted Owls in a post fire landscape. Journal of Wildlife Management 73: 1116- 1124. (In a radio telemetry study, California spotted owls preferentially selected high-severity fire areas, which had not been salvage logged, for foraging.)

Bond, M.L., D.E. Lee, R.B. Siegel, and M.W. Tingley. 2013. Diet and home-range size of California spotted owls in a burned forest. Western Birds 44: 114-126 (Home range size of spotted owls in the McNally fire was similar to, or smaller than, home ranges in unburned forests in the Sierra Nevada; owls in burned forest had a diet rich in small mammals, including pocket gophers.)

Lee, D.E., M.L. Bond, and R.B. Siegel. 2012. Dynamics of breeding-season site occupancy of the California spotted owl in burned forests. The Condor 114: 792-802. (Mixed-severity wildland fire, averaging 32% high-severity fire effects, did not decrease California spotted owl territory occupancy, and probability of territory extinction was lower in mixed-severity fire areas than in unburned mature/old forest. Post-fire salvage logging largely eliminated occupancy in areas that were occupied by owls after mixed-severity fire, but before salvage logging.)

Roberts, S.L. 2008. The effects of fire on California spotted owls and their mammalian prey in the central Sierra Nevada, California. Ph.D. Dissertation, University of California at Davis. (California spotted owl reproduction was 60% higher in a mixed-severity fire area [no salvage logging] than in unburned mature/old forest.)

Seamans, M.E., and R.J. Gutiérrez. 2007. Habitat selection in a changing environment: the relationship between habitat alteration and spotted owl territory occupancy and breeding dispersal. The Condor 109: 566-576. (The authors found that commercial logging of as little as 20 hectares, or about 50 acres, in spotted owl home ranges significantly reduced occupancy.) (Chad Hanson, JMP, pp. 1).

Response #8: We agree that California spotted owls are able to persist in landscapes that experience moderate-fire as well as some level of mixed and high severity wildfire (Keane 2013, Bond et al. 2002). High severity burned areas serve well as foraging habitat for spotted owls due to an increase and accessibility of prey species, but the duration of increased prey is unknown (Bond et al. 2009). While owls forage in high severity burned areas, they appear to select low-severity burn sites for roosting (ibid). Roberts (2008) suggested that fire, especially fire resulting in low to moderate levels of tree mortality, can help to maintain habitat features that are important for roosting and nesting California spotted owls.

Lee et al. (2012) used 11 years of breeding-season surveys data from 41 burned California spotted owl sites (1997-2007) in the Sierra Nevada were an average of 32% of owl habitat in a 200 ha-circle around core areas burned at high severity (D. Lee unpublished data). Roberts (2008) points out that high severity wildfire is one of the largest threats to the persistence of the California spotted owl, understanding how fire mediates the distribution and abundance of prey species is imperative for owl conservation. A high severity burn challenges the owls existence by restricting their resources needed to survive and produce young (Bedford 2003).

The importance of natural fire regimes and conversely the negative impacts of suppressing fire is a management concern. A paradigm shift occurred over the past 30 years, concerning wildfire and the importance of fire in maintaining forest structure, composition and function; the role of fire in maintaining our forests continues to be at the forefront of forest management (Sugarloaf Wildlife BE/BA 2013). A fundamental feature of the proposed action Alternative D is to reintroduce fire to the landscape. Proposed are 1,558 acres of low to moderate intensity severity underburns, with secondary and third entry treatments, and follow-up underburns (Sugarloaf DEIS p 51).

The Sugarloaf Project will reintroduce fire to the ecosystem and reduce wildfire threats to the community. Sugarloaf Project preferred Alternative D is based on input from biologists as well as other resources. The project is within wild and urban interface (WUI) and does not include group selection. Alternative D proposes 204-456 acres less thinning than alternatives B and C. Eight seven percent of stand retain all trees greater than 24 inches and forty-two percent of stands retain greater than 50 percent canopy cover. Variable thinning treatments are designed to retain 40-60 percent canopy cover. On south-facing slopes in the WUI defense zone along ridge-tops and upper slopes allows for trees up to 30 inch diameter and 40 percent canopy. Canopy cover increases to 40-50 on mid-slopes with variable thinning applied to north aspects; allowing for tree removal of trees up to 24 inch diameter. The lower slopes and Riparian Conservation Areas (RCAs) would maintain 50-60 percent canopy cover using variable thinning methods, allowing for removal of trees up to 20 inch dbh outside restricted riparian buffers (Sugarloaf Project DEIS p. 51).

Comment #9:

Black-backed Woodpecker Habitat Needs and Population Threats -2004 Framework Assumptions/Conclusions: The 2004 Framework FEIS did not recognize any significant conservation threats to the Black-backed Woodpecker, and the 2004 Framework ROD (p. 52) allowed post-fire clear-cutting in 90% of any given fire area, and allowed up to 100% of high-severity fire areas to be subjected to post-fire clear-cutting by requiring retention of only 10% of the total fire area unlogged (i.e., the 10% retention can be in low-severity fire areas). (Chad Hanson, JMP, pp. 1).

New Scientific Information:

Black-backed Woodpeckers rely upon large patches (generally at least 200 acres per pair) of recently killed trees (typically less than 8 years post-mortality) with very high densities of medium and large snags (usually at least 80-100 per acre), and any significant level of post-fire salvage logging largely eliminates nesting and foraging potential. Moreover, Hanson et al. (2012) (the Black-backed Woodpecker federal Endangered Species Act listing petition) found that there are likely less than 700 pairs of Black-backed Woodpeckers in the Sierra Nevada, and they are substantially threatened by ongoing fire suppression, post-fire salvage logging, mechanical thinning "fuel reduction" logging projects, and possibly climate change. On April 8, 2013, the U.S. Fish and Wildlife Service determined that the Sierra Nevada and eastern Oregon Cascades population of this species may be warranted for listing under the ESA. In addition, in the fall of 2012, the Forest Service determined that there is a significant concern about the conservation of Black-backed Woodpecker populations, in light of new scientific information indicating that current populations may be dangerously low and that populations are at risk from continued habitat loss due to fire suppression, post-fire logging, and mechanical thinning, recommending some key conservation measures to mitigate impacts to the population (Bond et al. 2012).

Bond, M.L., R.B. Siegel, and D.L. Craig. 2012. A Conservation Strategy for the Black-backed Woodpecker (Picoides arcticus) in California—Version 1.0. The Institute for Bird Populations, Point Reyes Station, California, For: U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. (Conservation recommendations include: a) identify the areas of the highest densities of larger snags after fire, and do not salvage log such areas (Recommendation 1.1); b) in areas where post-fire salvage logging does occur, do not create salvage logging patches larger than 2.5 hectares in order to maintain some habitat connectivity and reduce adverse impacts on occupancy (Recommendation 1.3); c) maintain dense, mature forest conditions in unburned forests adjacent to recent fire areas in order to facilitate additional snag recruitment (from beetles radiating outward from the fire) several years post-fire, which can increase the longevity of Black-backed Woodpecker occupancy in fire areas (Recommendation 1.4); d) do not conduct post-fire salvage logging during nesting season, May 1 through July 31 (Recommendation 1.5)); and e) maintain dense, mature/old unburned forests in order to facilitate high quality Black-backed Woodpecker habitat when such areas experience wildland fire (Recommendation 3.1).

Burnett, R.D., P. Taillie, and N. Seavy. 2011. Plumas Lassen Study 2010 Annual Report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. (Black-backed Woodpecker nesting was eliminated by post-fire salvage. See Figure 11 [showing nest density on national forest lands not yet subjected to salvage logging versus private lands that had been salvage logged.)

Burnett, R.D., M. Preston, and N. Seavy. 2012. Plumas Lassen Study 2011 Annual Report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. (Black-backed Woodpecker potential occupancy rapidly approaches zero when less than 40-80 snags per acre occur, or are retained (Burnett et al. 2012, Fig. 8 [occupancy dropping towards zero when there are fewer than 4-8 snags per 11.3-meter radius plot—i.e., less than 4-8 snags per 1/10th-acre, or less than 40-80 snags per acre.)

Hanson, C. T. and M. P. North. 2008. Postfire woodpecker foraging in salvage-logged and unlogged forests of the Sierra Nevada. Condor 110: 777–782. (Black-backed Woodpeckers selected dense, old forests that experienced high-severity fire, and avoided salvage logged areas [see Tables 1 and 2].)

Hutto, R. L. 2008. The ecological importance of severe wildfires: Some like it hot. Ecological Applications 18:1827–1834. (Figure 4a, showing about 50% loss of Black-backed Woodpecker post-fire occupancy due to moderate pre-fire logging [consistent with mechanical thinning] in areas that later experienced wildland fire.)

Odion, D.C., and Hanson, C.T. 2013. Projecting impacts of fire management on a biodiversity indicator in the Sierra Nevada and Cascades, USA: the Black-backed Woodpecker. The Open Forest Science Journal 6: 14-23 (in press). (High-severity fire, which creates primary habitat for Black-backed Woodpeckers, has declined >fivefold since the early 20th century in the Sierra Nevada and eastern Oregon Cascades due to fire suppression. Further, the current rate of high-severity fire in mature/old forest (which creates primary, or high suitability, habitat for this species) in the Sierra Nevada and eastern Oregon Cascades is so low, and recent high-severity fire in mature/old forest comprises

such a tiny percentage of the overall forested landscape currently (0.66%, or about 1/150th of the landscape), that even if high-severity fire in mature/old forest was increased by several times, it would only amount to a very small proportional reduction in mature/old forest, while getting Black-backed Woodpecker habitat closer to its historical, natural levels. Conversely, the combined effect of a moderate version of current forest management—pre-fire thinning of 20% of the mature/old forest (in order to enhance fire suppression) over the next 27 years, combined with post-fire logging of one-third of the primary Black-backed Woodpecker habitat, would reduce primary Black-backed Woodpecker habitat to an alarmingly low 0.20% (1/500th) of the forested landscape, seriously threatening the viability of Black-backed Woodpecker populations.)

Rota, C.T. 2013. Not all forests are disturbed equally: population dynamics and resource selection of Black-backed Woodpeckers in the Black Hills, South Dakota. Ph.D. Dissertation, University of Missouri-Columbia, MO. (Rota (2013) finds that Black-backed Woodpeckers only maintain stable or increasing populations (i.e., viable populations) in recent wildland fire areas occurring within dense mature/older forest (which have very high densities of large wood-boring beetle larvae due to the very high densities of medium/large fire-killed trees). And, while Black-backeds are occasionally found in unburned forest or prescribed burn areas, unburned "beetle-kill" forests (unburned forest areas with high levels of tree mortality from small pine beetles) and lower-intensity prescribed burns have declining populations of Black-backed Woodpeckers (with the exception of a tiny percentage of beetle-kill areas). The study shows that unburned beetle-kill forests do not support viable populations, but very high snag-density beetle-kill areas tend to slow the population decline of Black-backed Woodpeckers in between occurrences of wildland fire. Population decline rates are alarmingly fast in low-intensity prescribed burn areas, indicating that such areas do not provide suitable habitat. Black-backed Woodpeckers are highly specialized and adapted to prey upon wood-boring beetle larvae found predominantly in recent higher-severity wildland fire areas. Moreover, while Black-backed Woodpeckers are naturally camouflaged against the charred bark of fire-killed trees, they are more conspicuous in unburned forests, or low-severity burned forests, and are much more vulnerable to predation by raptors in such areas. For this reason, even when a Black-backed Woodpecker pair does successfully reproduce in unburned forest or low-severity fire areas, both juveniles and adults have much lower survival rates than in higher-severity wildland fire areas.)

Saab, V.A., R.E. Russell, and J.G. Dudley. 2009. Nest-site selection by cavity-nesting birds in relation to postfire salvage logging. Forest Ecology and Management 257: 151–159. (Black backed Woodpeckers select areas with about 325 medium and large snags per hectare [about 132 per acre], and nest-site occupancy potential dropped to near zero when snag density was below about 270 per hectare, or about 109 per acre [see Fig. 2A, showing 270 snags per hectare as the lower boundary of the 95% confidence interval].)

Seavy, N.E., R.D. Burnett, and P.J. Taille. 2012. Black-backed woodpecker nest-tree preference in burned forests of the Sierra Nevada, California. Wildlife Society Bulletin 36: 722-728. (Black-backed Woodpeckers selected sites with an

average of 13.3 snags per 11.3-meter radius plot [i.e., 0.1-acre plot], or about 133 snags per acre.)

Siegel, R.B., M.W. Tingley, and R.L. Wilkerson. 2011. Black-backed Woodpecker MIS surveys on Sierra Nevada national forests: 2010 Annual Report. A report in fulfillment of U.S. Forest Service Agreement No. 08-CS-11052005-201, Modification #2; U.S. Forest Service Pacific Southwest Region, Vallejo, CA. (Black-backed woodpecker occupancy declines dramatically by 5-7 years post-fire relative to 1-2 years post-fire, and approaches zero by 10 years post-fire [Fig. 15a].)

Siegel, R.B., M.W. Tingley, R.L. Wilkerson, M.L. Bond, and C.A. Howell. 2013. Assessing home range size and habitat needs of Black-backed Woodpeckers in California: Report for the 2011 and 2012 field seasons. Institute for Bird Populations. (Black-backed woodpeckers strongly select large patches of higher-severity fire with high densities of medium and large snags, generally at least 100 to 200 hectares (roughly 250 to 500 acres) per pair, and post-fire salvage logging eliminates Black-backed woodpecker foraging habitat [see Fig. 13, showing almost complete avoidance of salvage logged areas]. Suitable foraging habitat was found to have more than 17-20 square meters per hectare of recent snag basal area [pp. 45, 68-70], and suitable nesting habitat was found to average 43 square meters per hectare of recent snag basal area and range from 18 to 85 square meters to hectare [p. 59, Table 13]. Moreover, Appendix 2, Fig. 2 indicates that the Sierra Nevada population of Black-backed Woodpeckers is genetically distinct from the Oregon Cascades population, though additional work needs to be conducted to determine just how distinct the two populations are. Siegel et al. 2013 also found that the small number of Black-backed Woodpeckers with mostly unburned forest home ranges had home ranges far larger than those in burned forest, and that the birds in unburned forest were traveling more than twice as far as those in burned forest in order to obtain lesser food than those in burned forests, indicating that such areas do not represent suitable, viable habitat for this species.)

USFWS. 2013. 90-day Finding on a Petition to List Two Populations of Black-backed Woodpecker as Threatened or Endangered. U.S. Fish and Wildlife Service, Washington, D.C., April 9, 2013. (USFWS (2013), on page 14, "conclude[d] that the information provided in the petition or in our files present substantial scientific or commercial information indicating that the petitioned action may be warranted for the Oregon Cascades-California and Black Hills populations of the black-backed woodpecker due to the present or threatened destruction, modification, or curtailment of the populations' habitat or range as a result of salvage logging, tree thinning, and fire suppression activities throughout their respective ranges." USFWS (2013), on page 19, also "conclude[d] that the information provided in the petition and available in our files provides substantial scientific or commercial information indicating that the petitioned action may be warranted due to small population sizes for the Oregon Cascades-California and Black Hills populations, and due to climate change for the Oregon Cascades-California population."

USFWS (2013), at pages 18-19, concluded that substantial scientific evidence indicates that current populations may be well below the level at which a significant risk of extinction is created based upon Traill et al. (2010), and

concluded that, while some climate models predict increasing future fire, others predict decreasing future fire (due to increasing summer precipitation), and, in any event, models predict a shrinking acreage of the middle/upper-elevation conifer forest types upon which Black-backed Woodpecker depend most (range contraction). (Chad Hanson, JMP, pp. 1).

Response #9: The Sugarloaf Project is not proposing post fire salvage logging. There are no burned areas within or close to the Sugarloaf Project. Habitat and or distribution population monitoring for Management Indicator Species (MIS), which includes the Black-backed woodpecker, is conducted at the Sierra Nevada scale. Refer to the 2010 SNF Bioregional MIS Report (USDA 2010) for habitat and MIS details. Project-level effects on MIS habitat are analyzed and disclosed as part of the environmental analysis under the National Environmental Policy Act. This involves examining the impacts of the Proposed Project Alternatives on MIS habitat by discussing how direct, indirect and cumulative effects will change the habitat analysis area. These project-level impacts to habitat are related to broader scale (bioregional) population and or habitat trends. The appropriate approach for relating project-level impacts to broader scale trends depends on the type of monitoring identified for MIS in the LRMP as amended by the SNF MIS Amendment ROD. Hence, where the Plumas NF LRMP as amended by the SNF MIS Amendment ROD identifies distribution population monitoring for an MIS, the project-level effects analysis for that MIS is informed by available distribution population monitoring data, which are gathered at the bioregional scale. The bioregional scale monitoring identified in the 1988 Plumas NF LRMP, as amended, for MIS analyzed for the Sugarloaf Project is summarized in the EA (Chapter 3, Management Indicator Species Report: Direction Regarding the Analysis of Project-Level Effects on MIS Habitat, Direction Monitoring of MIS Population and Habitat Trends at the Bioregional Scale, Habitat Status and Trend, Population Status and Trend).

On 08 April 2013, the U.S. Fish and Wildlife service announced a 90-day status review finding on a petition to list the Oregon Cascades-California population and Black Hills population of the Black-backed Woodpecker under the Endangered Species Act of 1973, as amended (Act), as subspecies or distinct population segments that are endangered or threatened, and to designate critical habitat concurrent with the listing (Federal Registry Document 2013-07897). U.S. Fish and Wildlife Service has found that these two populations may warrant listing and initiated a status review to determine whether listing each population as endangered or threatened under the Act is warranted. This 90-day finding does not constitute a status review under the Act. The Service will report on their finding on whether a petition action is warranted in a 12-month finding, after completing a thorough status review of the species. A substantial 90-day finding does not mean that the 12-month finding will result in a warranted finding.

We agree with the commenter that there is uncertainty about current population size, population trend, and extinction risk for Black-backed Woodpeckers, as did the U.S. Fish and Wildlife Service (USFWS) in their 90-Day finding on a petition to list the species as Endangered or Threatened. The USFWS reported that although some anecdotal observations may indicate that the species is less

common than it was thought to be historically, the information provided by the petitioners does not indicate a clear decrease in the species' current range compared to its historical range (USFWS 2012). Further, the nomadic nature of Black-backed Woodpecker (i.e., traveling across the landscape from one burned patch of forest to another) not only complicates efforts to produce reliable population size estimates, but requires substantial modeling (theoretical and empirical) efforts to adequately assess extinction risk for woodpeckers in the ephemeral habitats they inhabit. It is inherently difficult to account for uncertain and unknown risks to any species. The Black-backed Woodpecker's use of ephemeral habitats exacerbates these difficulties as it is not only difficult to estimate population sizes with such a nomadic species (traveling across the landscape from one burned patch of forest to the next), but the species also occurs in unburned forest habitat. Further, predicting future habitat availability (occurrence of large-scale wildfire) is challenging. However, trends indicate that fire size and frequency are on the rise in western U.S. forests (Miller and Safford 2012, Miller et al. 2012).

Comment #10: Pacific Fishers, Fire, and Forest Structure - 2004 Framework Assumptions/Conclusions:

The 2004 Framework FEIS (pp. S-15, 138, 243, and 246) assumed that mixed-severity fire, including higher-severity fire patches, was a primary threat to Pacific fishers, and the Framework FEIS (p. 242) did not include density of small/medium-sized trees among the important factors in its assessment of impacts to fishers. (Chad Hanson, JMP, pp. 1).

New Scientific Information:

The data indicate that one of the top factors predicting fisher occupancy is a very high density of small/medium-sized trees, including areas dominated by fir and cedar, and that Pacific fishers may benefit from some mixed-severity fire.

Hanson, C.T. (in press 2013). Pacific fisher habitat use of a heterogeneous post-fire and unburned landscape in the southern Sierra Nevada, California, USA. (Pacific fishers are using pre-fire mature/old forest that experienced moderate/high-severity fire more than expected based upon availability, just as fishers are selecting dense, mature/old forest in its unburned state as well. When fishers are near fire perimeters, they strongly select the burned side of the fire edge.)

Underwood, E.C., J.H. Viers, J.F. Quinn, and M. North. 2010. Using topography to meet wildlife and fuels treatment objectives in fire-suppressed landscapes. Environmental Management 46: 809-819. (Fishers are selecting the densest forest, dominated by fir and cedar, with the highest densities of small and medium-sized trees, and the highest snag levels.)

Zielinski, W.J., R.L. Truex, J.R. Dunk, and T. Gaman. 2006. Using forest inventory data to assess fisher resting habitat suitability in California. Ecological Applications 16: 1010-1025. (The two most important factors associated with fisher rest sites are high canopy cover and high densities of small and medium-

sized trees less than 50 cm in diameter [Tables 1 and 3].)

Zielinski, W.J., J.A. Baldwin, R.L. Truex, J.M. Tucker, and P.A. Flebbe. 2013. Estimating trend in occupancy for the southern Sierra fisher (Martes pennanti) population. Journal of Fish and Wildlife Management 4: 1-17. (The authors investigated fisher occupancy in three subpopulations of the southern Sierra Nevada fisher population: the western slope of Sierra National Forest; the Greenhorn mountains area of southwestern Sequoia National Forest; and the Kern Plateau of southeastern Sequoia National Forest area, using baited track-plate stations. The Kern Plateau area is predominantly post-fire habitat [mostly unaffected by salvage logging] from several large fires occurring since 2000, including the Manter fire of 2000 and the McNally fire of 2002. The baited track-plate stations used for the study included these fire areas [Fig. 2]. Mean annual fisher occupancy at detection stations was lower on Sierra National Forest than on the Kern Plateau. Occupancy was trending downward on Sierra National Forest, and upward on the Kern Plateau, though neither was statistically significant, possibly due to a small data set.)

Response #10: Although fisher may exploit post-fire landscapes, potentially taking advantage of increased prey availability in these areas, the physical structure of the forest, and prey community composition associated with such forest, are thought to be critical for fisher habitat use (USDI Powell 2004).

There is a growing body of scientific literature showing fire is a natural component of the forest. The reader is directed to WL #2. One of the goals of the Sugarloaf Project is to reintroduce fire to the landscape. The BE/BA discussed the importance of underburns with emphasis on retaining habitat components related to fisher habitat (Zielinski et al. 2013) (Sugarloaf Wildlife BE/BA p. 48).

The Pacific fisher is currently managed as a USDA Forest Service sensitive species. The PNF LRMP provides management guidelines that incorporate Regional direction for each species. Current direction for threatened, endangered and sensitive species and other wildlife species and their habitats can be found in the PNF LRMP, as amended by Sierra Nevada Forest Plan Amendment (SNFPA) and its implementing Final Supplemental Environmental Impact Statement (FSEIS), Record of Decision (ROD), for Wildlife, Fish, Riparian Ecosystems and riparian-dependent wildlife species (USDA Forest Service 2004). On 19 March 2013, the U.S. Fish and Wildlife Service, opened an information gathering period regarding the status of the fisher throughout the range of its West Coast distinct population segment. The status review will include analysis of whether the West Coast fisher warrants listing as endangered or threatened under the Endangered Species Act of 1973, as amended (Act; Federal Registry Document 2013-07853).

Currently, the analysis area does not appear to provide habitat needed to sustain resident fisher populations.Approximately 65% of the PNF has been systematically surveyed, by the Pacific Southwest Research Station (PSW), district biologists/wildlife technicians and contractors, to protocol for mesocarnivores using track plates and camera stations (American Marten, Fisher, Lynx and Wolverine: Survey Methods for Their Detection; Zielinski and Kucera 1995). To date, there have been no fisher observations on the PNF, but reintroduction efforts on adjacent private lands have used radio transmitters to

track individuals making forays onto the forest. However, we manage the forest to perpetuate those attributes that are important to fishers to provide suitable travel corridors between resident populations and grow forest habitat to promote establishment of future populations (SNFPA FSEIS ROD 2004).

Individual fishers from a reintroduced population adjacent to the forest have made forays onto the west side of the Plumas, but these individuals did not stay on the forest. The reintroduced population of fisher adjacent to PNF appears to be residing over seven miles southwest of the analysis area (A. Facka personal communication). There appears to be considerable consensus among the scientific community on the correlation among several key habitat features and fisher presence. The analysis area does not appear to provide critical habitat needed to sustain resident fisher populations and therefore does not currently contribute to this mesocarnivore population in the Sierra Nevada mountain range.

The fishers need for overhead cover is very well documented in the April 8, 2004 Federal Register. Fishers select stands with dense canopy cover which provides security cover from predators, increases snow interception, lowers the energetic costs of traveling between foraging sites, and preferred prey species may be more abundant and vulnerable in areas of higher canopy cover (Ibid). A number of studies have shown that fishers avoid areas with little forest cover or significant human disturbance and prefer large areas of contiguous interior forest (Ibid). The analysis area does not appear to provide critical habitat needed to sustain resident fisher populations and therefore does not currently contribute to this mesocarnivore population in the Sierra Nevada mountain range.

Economic and Social Environment (ESE)

Comment #11: We support the selection of Alternative D – Proposed Action as the preferred alternative. Alternative D will meet the purpose and need for the Sugarloaf Project, "To reduce wildfire hazards to natural resources on NFS lands, to promote forest health, improve watershed health, and to contribute to the economic stability of rural communities" (Ken Wilde, SPI, pp. 1).

Response #11: Thank you for your support of alternative D.

Comment #12: Alternative D fulfills land management direction as described in the Plumas National Forest Land and Resource Management Plan as amended by the 2004 Sierra Nevada Forest Plan Amendment and ROD. The proposed treatments are designed to dovetail with other hazardous fuels work and are strategically positioned to fill in the gaps between defensible fuels profile zones planned prior to 2012 (HFQLG Act). (Ken Wilde, SPI, pp. 1).

Response #12: Thank you for your support of Alternative D and recognition of previous and adjacent fuels reduction work that was completed within the project area.

Comment #13: Alternative D will generate approximately 4.6 million board feet of saw logs, 147 direct and indirect jobs, and $6.3 million in employee related income (pg. 3-187 DEIS). Very important outputs for the local communities and resource based industries. (Ken Wilde, SPI, pp. 1).

Response #13: Thank you for your support of alternative D.

Comment #14: Another positive attribute of Alternative D is it does not include below cost mechanical treatment areas or require biomass removal allowing for a positive cost benefit of $277,643 (pg. 3-185 DEIS). (Ken Wilde, SPI, pp. 1).

Response #14: Thank you for your support of alternative D.

Comment #15: We encourage you to expand the discussion of the limited biomass management options in the FEIS as a matter of disclosure. This may also raise awareness of the need for biomass energy capacity with the potential supporters and partners. (Kathleen Martyn Goforth, EPA, pp. 1).

Response #15: Throughout northern California, cumulative years of reduced timber harvesting activities (including those on federal lands) have resulted in the loss of infrastructure (i.e., local mill closures) to complete such activities. During the period from 1990 to 2010, there has been 74 sawmill and 11 miscellaneous mill closures (table A9-2) (Ehinger 2010). Loss of this infrastructure could significantly reduce or eliminate future economic and environmental opportunities generated by the removal of forest products from national forest lands negating opportunities for long-term employment and rural community stability.

A loss of forest products infrastructure could eventually lead to a decline of other local small businesses such as auto and truck repair shops, gas stations, grocery stores, hardware stores, clothing stores, restaurants and so forth. As families leave the area to find employment elsewhere, then other infrastructures such as libraries, schools, and doctors or medical clinics would also see a decline or a collapse of services.

Table A9-2. Mill closures by type and year.

Mill Type	1990–1994	1995–1999	2000–2004	2005–2010	Totals
Sawmills	40	11	15	8	74
Plywood	0	1	0	0	1
Veneer	1	2	1	0	4
Pulp	2	0	1	0	3
Board	0	0	3	0	3
Totals	43	14	20	8	85

The economic resiliency of Plumas and Sierra Counties are low. The major employment industries include manufacturing lumber, the logging operators, transportation, the Forest Service and the county are all inter-connected and

represent nearly 40 percent of employment. If manufacturing of lumber is diminished or stopped, then all of these industries would be affected by the lack of production by the mill. There is not another industry which can carry the community through economic lows.

The Plumas National Forest is unique in that some of the infrastructure is still in place; however these industries in the county are experiencing numerous years of negative growth and are faced with lay-offs, mill closures, and operators liquidating equipment. The loss of this industry will have a negative effect on managing NFS lands in a cost effective manner. The continuation of current conditions would preclude and/or notably limit opportunities for long-term employment and rural community stability.

The reference information used by EPA displaying several biomass facilities as open is incorrect. Due to the decline in local economies, these facilities are currently closed with no plans to re-open (i.e. POPI's). Some of the designated facilities listed are co-generation plants located in Quincy and Lincoln, CA, owned and managed by Sierra Pacific Industries (SPI). The last several years SPI has declined purchasing wood chips from the Forest Service, indicating they did not need the inventory as their own timber harvesting operations are generating enough biomass waste to power facilities in a self sustaining manner.

Currently, there are no stand alone co-gen plants within a 35 mile radius from the Sugarload Project, considered within a reasonable, cost-effective haul distance based on standard operationg practices and assumptions applied to determined minimum appraisal values. Typically, beyond 35 miles of haul, the transport of biomass for processing becomes cost prohibitive.

Comment #16: We support the selection of Alternative D – Proposed Action as the preferred alternative. Alternative D will meet the purpose and need for the Sugarloaf Project, "To reduce wildfire hazards to natural resources on NFS lands, to promote forest health, improve watershed health, and to contribute to the economic stability of rural communities." (Ken Wilde, SPI, pp. 1).

Response #16: Thank you for your support of alternative D.

Appendix A-10: Alternative B: Forest Plan Amendment

The Sugarloaf Project was scoped with the publication of the Notice of Intent in the Federal Register on Tuesday, June 5, 2012 (Vol. 77, No.108, pp. 33158-33159), disclosing Alternative B as the proposed action, designed to fulfill mandates per the Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG Act). On September 30, 2012, the 2008 Consolidated Appropriations Act authorities to implement the HFQLG Act ended, along with management direction. The Forest Service determined the proposed amendments would be non-significant based on criteria found in FSM 1900, Chapter 1920, section 1926.5, as follows:

FSM 1926.51 – Changes to the Land Management Plan that Are Not Significant

1. The actions proposed under Alternative B would not significantly alter the multiple-use goals and objectives for long-term land and resource management, rather, defensible fuel profile zones (DFPZs) and 2004 fire and fuel management goals are similar,
2. Gaps (less than 1/10 to 1/2 acre) replaced by Group Selections (up to ½ acre to 2.0 acre gaps) are specific the project area, limited to 71 acres; and
3. The strategy, goals and objectives are very similar for the Aquatic Management Strategy (AMS) and Riparian Conservation Areas (RCA) under SNFPA 2004 that would be replaced by Riparian Area Management (RAM) and Riparian Habitat Conservation Areas (RHCA) under HFQLG 1999. Riparian buffers along with design features and mitigations protect watersheds, and therefore wildlife and aquatic species habitat. Minor adjustments of management area boundaries associated with replacing RCAs with RHCAs and associated management prescriptions are considered minor changes to standards and guidelines. The major difference for wildlife habitat is that under SNFPA 2004 treatments can be conducted to maintain or improve habitat within Protected Activity Centers (PACs), while HFQLG limited allowable treatments to low-intensity underburning.

Under alternative B, the pertinent goals and objectives and standards and guidelines related to the 1988 Plumas National Forest Land and Resource Management Plan (commonly referred to as the "Forest Plan"), as amended by 2004 Record of Decision on the SNFPA Final Supplemental EIS (FSEIS)(pgs. 49 - 66) would not apply as described in section D. Management Standards and Guidelines, but would be replaced by those provided on 2004 Record of Decision (pgs. 66-69) as follows:

"The Lassen and Plumas National Forests and the Sierraville Ranger District of the Tahoe National Forest will implement the HFQLG Forest Recovery Act Pilot Project, consistent with the HFQLG Forest Recovery Act and Alternative 2 of the HFQLG EIS. The HFQLG Forest Recovery Act pilot project is designed to test and demonstrate the effectiveness of certain fuels and vegetation management activities in meeting ecologic, economic, and fuel reduction objectives. Fuels and vegetation management activities include constructing a strategic system of defensible fuels profile zones (DFPZs), group selection, and individual tree selection. A management program for riparian areas is also included in the pilot project. This Decision includes the following direction for the HFQLG Forest Recovery Act Pilot Project activities, and non-pilot project activities, where specifically noted:

- Apply land allocations to the Lassen and Plumas National forests, and the Sierraville Ranger District of the Tahoe National Forest, which are described in the HFQLG Forest Recovery

Act ROD and FEIS, with the exception that the land allocation for goshawk territories and marten and fisher habitat management areas do not apply. Apply the standards and guidelines displayed in Table 2 below to the applicable land allocations. The direction in Table 2 applies when a conflict arises between existing forest plan standards and guidelines and the management direction in Table 2.

- Apply the standards and guidelines detailed in this appendix for management of goshawk PACs and forest carnivore den sites. Standards and guidelines for management of goshawk PACs apply with the caveat that DFPZs may be constructed within goshawk PACs, subject to the following limitations. In goshawk PACs, prohibit mechanical treatments within a 500-foot radius buffer around nest trees. Allow prescribed burning within the 500-foot radius buffer. Prior to burning, conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), as needed to protect important elements of goshawk habitat. The remaining area of the PAC may be mechanically treated to achieve the fuels reduction strategy for the DFPZ. Conduct mechanical treatments in no more than 5 percent per year and 10 percent per decade of the total acres in goshawk PACs within the 11 Sierra Nevada national forests.

- Implement the resource management activities mandated by the HFQLG Forest Recovery Act.

- Apply SAT Guidelines, as set forth in the HFQLG EIS and ROD to vegetation management actions that are proposed for fuels reduction, timber management, area thinning, prescribed fire and salvage harvest within the Pilot Project Area for the life of the pilot project. Continue the long-term strategy for anadromous fish-producing watersheds for the Lassen National Forest, as set forth in Appendix I of the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement".

Table A10-1 displays the standards and guidelines direction from the 2004 Record of Decision on the SNFPA Final Supplemental EIS (FSEIS)(pgs. 68-69) that would apply under Alternative B.

Table A10-1. 2004 SNFPA: Applicable Standards and Guidelines under alternative B.

HFQLG Land Allocation	Standards and Guidelines
Offbase and deferred areas	The following HFQLG resource management activities are prohibited: DFPZ construction, group selection, individual tree selection, all road building, all timber harvesting activities, and any riparian management that involves road construction or timber harvesting.
Late successional old growth (LSOG) rank 4 and 5	Group selection and individual tree selection are not allowed in LSOG 4 and 5 stands. DFPZ construction is allowed in LSOG 4 and 5 stands. Design DFPZs to avoid old forest stands (CWHR classes 5M, 5D, 6) within this allocation.
California spotted owl ACs	The following resource management activities - DFPZs, group selection, individual tree selection, and riparian restoration projects and other timber harvesting - are not allowed within spotted owl PACs.
California spotted owl habitat areas (SOHAs)	The following resource management activities - DFPZs, group selection, individual tree selection, and riparian restoration projects and other timber harvesting - are not allowed within spotted owl SOHAs.
National forest lands outside of the above allocations and available for vegetation and fuels management activities specified in the HFQLG Act	**Defensible Fuel Profile Zone (DFPZ)**
	<u>Eastside pine types and all other CWHR 4M and 4D classes:</u> Design projects to retain at least 30% of existing basal area, generally comprised of the largest trees. Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable. For CHWR 4M and 4D classes that are not eastside pine types, retain, where available, 5% of total post-treatment canopy cover in lower layers comprised of trees 6 - 24-inches dbh. No other canopy cover requirements apply.
	<u>CWHR 5M, 5D, and 6 classes except those referenced above:</u> Design projects to retain a minimum of 40% canopy cover. Design projects to avoid reducing pre-treatment canopy cover by more than 30%. Design projects to retain at least 40% of existing basal area, generally comprised of the largest trees. Design projects to retain, where available, 5% of total post-treatment canopy cover in lower layers comprised of trees 6-24 inches dbh. Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable.
	All other CWHR class stands: Retain all live trees ≥30 inches dbh, except to allow for operations. Minimize operations impacts to ≥30-inch trees as much as practicable.
	Group selection
	Design projects to retain all live trees ≥30 inches dbh, except allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable.
	Area thinning (individual tree selection)
	All eastside pine types: Design projects to retain at least 30% of existing basal area, generally comprised of the largest trees Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable. Canopy cover change is not restricted.

HFQLG Land Allocation	Standards and Guidelines
National forest lands outside of the above allocations and available for vegetation and fuels management activities specified in the HFQLG Act	CWHR classes 4D, 4M, 5D, 5M and 6 (except eastside pine type): Where vegetative conditions permit, design projects to retain ≥50% canopy cover after treatment averaged within the treatment unit, except where site specific project objectives cannot be met. Where 50 percent canopy cover retention cannot be met as described above, design projects to retain a minimum of 40% canopy cover averaged within the treatment unit. Design projects to avoid reducing canopy cover by more than 30% from pre-treatment levels. Design projects to retain at least 40% of the existing basal area, generally comprised of the largest trees. Design projects to retain, where available, 5% of total post-treatment canopy cover in lower layers comprised of trees 6-24 inches dbh. Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable.
	Down wood and snags Determine retention levels of down woody material on an individual project basis. Within westside vegetation types, generally retain an average over the treatment unit of 10-15 tons of large down wood per acre. Within eastside vegetation types, generally retain an average of three large down logs per acre. Emphasize retention of wood that is in the earliest stages of decay. Consider the effects of follow-up prescribed fire in achieving desired retention levels of down wood. Determine snag retention levels on an individual project basis. Design projects to sustain across a landscape a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife. Retain some mid and large diameter live trees that are currently in decline, have substantial wood defect, or have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure. When determining snag retention levels, consider land allocation, desired condition, landscape position, and site conditions (such as riparian areas and ridge tops), avoiding uniform distribution across large areas. During project-level planning, consider the following guidelines for large-snag retention: In westside mixed conifer and ponderosa pine types, four of the largest snags per acre. In the red fir forest type, six of the largest snags per acre. In eastside pine and eastside mixed conifer forest types, three of the largest snags per acre. In westside hardwood ecosystems, four of the largest snags per acre (hardwood or conifer). Where standing live hardwood trees lack dead branches, six of the largest snags per acre to supplement wildlife needs for dead material. Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Consider leaving fewer snags strategically located in treatment areas within the WUI and DFPZs. While some snags will be lost due to hazard removal or use of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels.
	Spotted Owl Surveys Prior to undertaking vegetation treatments in spotted owl habitat having unknown occupancy, conduct surveys in compliance with the Pacific Southwest Region survey direction and protocols, and designate PACs where appropriate according to survey results.

Table A10-2 summarizes the applicable standards and guidelines under Alternative B.

Table A10-2. HFQLG Table 2 Standards and Guidelines (pages 68-69) applied under alternative B.

Land Allocation	Land Allocation	Land Allocation	Land Allocation	Basal Area Retention	Operability
Late Successional Old Growth (LSOG) Rank 4 and 5. Design DFPZs to avoid old forest stands (CWHR 5M, 5D, 6)	No Group Selection or Individual Tree Selection, DFPZ construction allowed. See DFPZ standards and guidelines below.				
CASPO-PAC	No Harvest				
CASPO-SOHA	CASPO-SOHA	CASPO-SOHA	CASPO-SOHA	CASPO-SOHA	CASPO-SOHA
DFPZ - CWHR 5M, 5D, 6	30" dbh	40% CC	30% CC Reduction	40% Existing	> 30" dbh
DFPZ - CWHR 4M, 4D	30" dbh	No Restrictions	No Restrictions	30% Existing	> 30" dbh
DFPZ - All Other CWHR	30" dbh	No Restrictions	No Restrictions	No Restrictions	> 30" dbh
Group Selection	30" dbh	No Restrictions	No Restrictions	No Restrictions	> 30" dbh
Area Thinning (ITS) - CWHR 4D, 4M, 5D, 5M, 6	30" dbh	40% CC - 50% CC	30% CC Reduction	40% Existing	> 30" dbh

Alternative B requires replacing standard Riparian Conservation Area (RCA) no treatment or equipment exclusion buffers as described in the 2004 SNFPA ROD with riparian habitat conservation areas (RHCAs) under HFQLG Act:

1. RCA buffer widths to be replaced:

   Perennial Streams: 300 feet on each side of the stream, measured from the bank full edge of the stream.

   Seasonally Flowing Streams (includes intermittent and ephemeral streams): 150 feet on each side of the stream, measured from the bank full edge of the stream.

   Streams in Inner Gorge: top of inner gorge (stream adjacent slopes greater than 70 percent gradient).

2. RHCAs buffer widths would be applied as follows:

   Perennial fish bearing streams and lakes: 300 feet on each side of perennial fish bearing streams and lakes, measured from the bank full edge.

   Perennial non-fish bearing streams, ponds, wetlands greater than 1 acre, and lakes: 150 feet on each side of the feature, measured from the bank full edge.

   Intermittent and ephemeral streams, wetlands less than 1 acre, and landslides: Minimum 100 feet on each side of the feature, measured from the bank full edge. Features influencing site-specific RHCA buffers include: (1) top of inner gorge, (2) 100-year floodplain, (3) Outer edge of riparian vegetation, and (4) A distance equal to one or two tree heights. The average height of a site potential tree has been determined to be 150 feet on the Feather River Ranger District. This

means a 150-foot RHCA buffer width is applied to seasonally flowing streams (intermittent or ephemeral) that have a definable channel and evidence of annual scour and deposition, instead of a 100-foot RHCA buffer.

Streamside Management Zones (SMZs): SMZs varies from 0 to 50 feet of either side of the stream reach. For ephemeral streams, the range is 25 to 50 feet depending on active stream channel conditions and slope stability (see the 1988 Plumas National Forest Land Resource Management Plan; appendix M).